Analysis of Delivery Options for the Presidio Parkway Project

CTC PROJECT PROPOSAL REPORT SUBMISSION
February 2010

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CONTENTS

EXHIBITS

APPENDICES

PREFACE

The Analysis of Delivery Options for the Presidio Parkway Report is a summary of the Doyle Drive Replacement Project, which has been commissioned by the California Department of Transportation (the Department) and the San Francisco County Transportation Authority (the Authority). The Department and the Authority are referred to as the Project Sponsors throughout the report.

The report includes the results of quantitative and qualitative analyses of the full life cycle costs of delivering the Project using a traditional Design-Bid-Build (DBB) method compared with Design-Build-Finance (DBF) and Design-Build-Finance-Operate-Maintain (DBFOM) methods.

The Project Sponsors have determined that the methodology described in this report is consistent with public sector best practices observed in other U.S. and international jurisdictions, and the findings rest on valid assumptions. The report demonstrates that the value for money for the DBFOM option is sufficient to warrant nomination to the California Transportation Commission for its approval to proceed with a public/private partnership delivery in accordance with requirements set forth in Streets & Highways Code Section 143.

On the basis of this analysis, the Public Infrastructure Advisory Commission passed a motion (on January 21, 2010) unanimously supporting the Project Sponsors to take appropriate steps to proceed with the DBFOM procurement option in accordance with applicable laws and guidelines.

DISCLAIMER

Pursuant to Contract No 06/07-29 dated January 1, 2007, between Arup / Parsons Brinckerhoff Joint Venture (the Consultant Team) and San Francisco County Transportation Authority (the Authority), enclosed is the Presidio Parkway Analysis of Delivery Options Report.

Current accepted professional practices and procedures were used in the development of this report. However, as with any forecast, there may be differences between forecasted and actual results. The financial results were prepared by Arup. PB forecasted the operations and maintenance costs and provided input into the development of the construction costs. The report contains reasonable assumptions, estimates, and projections that may not be indicative of actual or future values or events and are therefore subject to substantial uncertainty. Future developments cannot be predicted with certainty, and this may affect the estimates or projections expressed in this report, consequently the Consultant Team specifically does not guarantee or warrant any estimate or projections contained in this report.

Please note that our findings do not constitute recommendations as to whether or not the Project Sponsors should proceed with the Presidio Parkway, Doyle Drive Replacement Project.

This document is intended only for the information of the California Department of Transportation and the Authority. It is not intended for and should not be relied upon by any third party, and no responsibility is undertaken to any third party.

Our findings are based on limited technical, financial, and commercial data concerning the potential procurement options. The Consultant Team has relied upon the reasonable assurances of independent parties and is not aware of any facts that would make such information misleading. We envisage that if the Presidio Parkway, Doyle Drive Replacement Project is to be taken forward, further validation of our findings will be undertaken as part of the procurement process.

We must emphasize that the realization of any prospective financial information set out within our report is dependent on the continuing validity of the assumptions on which it is based. We accept no responsibility for the realization of the prospective financial information. Actual results are likely to be different from those shown in the prospective financial information because events and circumstances frequently do not occur as expected, and the differences may be material.

The integrity of the Financial Model referred to in this report has been the subject of independent testing by Mercer, as detailed in Appendix J.

Executive Summary

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REPORT SYNOPSIS

The Presidio Parkway, Doyle Drive Replacement Project is intended to replace the existing 73-year-old south access to the Golden Gate Bridge (see Exhibit 1). Doyle Drive was originally built with narrow lanes, no shoulders, and no median to separate on-coming traffic. It is now structurally deficient, vulnerable to earthquakes, and at the end of its useful life. The facility serves 120,000 trips per day, and it is the only regional roadway link between North Bay Area counties and San Francisco and the San Francisco Peninsula.

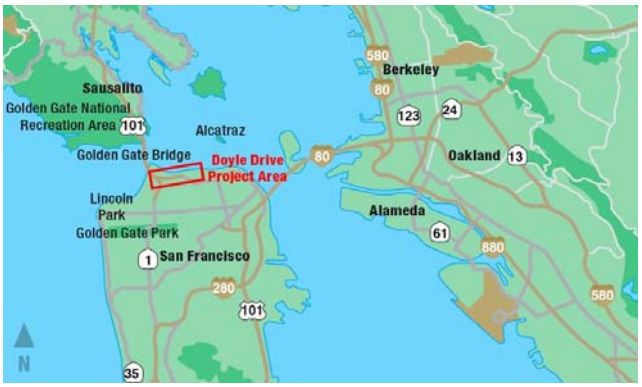
The completed project will be known as the Presidio Parkway and is expected to cost $928.8 million to construct (in year of expenditure dollars, YOE$).[1] The Presidio Parkway was environmentally cleared in December 2008 under both the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA). Because of concerns about the need to ensure seismic safety for the travelling public, the California Department of Transportation (the Department) decided to accelerate the date of initiation of the construction phase. The Presidio Parkway, Doyle Drive Replacement Project was split into two major construction phases.

The first four contracts (Contracts 1 through 4) which make up Phase I and which started in November 2009 will ensure that seismic safety is achieved as soon as possible. By the time Contract 4 is completed, all traffic will be circulating on new structures and temporary detour roads that comply with seismic standards. Phase II, consisting of Contracts 5 through 8, approximately two-thirds of the construction cost, will complete the overall project.

The overall project poses significant challenges: the existing roadway must remain open to traffic throughout the construction phase; four federal agencies either have jurisdiction over portions of the right of way or must be consulted for other reasons; several different contractors depend on the timely implementation of separate construction contracts in order to be able to access the site and deliver their portion of the overall project on time and on budget. The risks to the schedule and to the budget are significant.

[1] Per the Initial Financial Plan, May 2009, submitted to the FHWA and assuming a traditional procurement approach.

Exhibit 1: Project Location



The Authority and the Department (the Project Sponsors), engaged the Arup/PB Joint Venture (the Consultant Team) to conduct an initial review and assessment of the construction and service delivery options available for the procurement of the Phase II of the overall project, including Public-Private Partnership (P3) methods. Project delivery using a P3 arrangement was recently authorized in California under Senate Bill 4 (SBX2 4, adopted in February, 2009, herein referred to as SB4).

Project Delivery Options Considered

Three project delivery options were considered:

- Design-Bid-Build (**DBB**): the predominant highway project delivery method in California and is the baseline against which other options were evaluated. Project financing in this option is provided solely by public agencies.
- Design-Build-Finance (**DBF**): the responsibility for completing design and construction is transferred to the private sector contractor, who is also responsible for raising private financing to fund construction. The public sector makes payments to the private contractor to cover the cost of construction and financing costs.
- Design-Build-Finance-Operate-Maintain (**DBFOM**): a private concessionaire is responsible for completing design and construction, raising private finance to fund construction of the project assets, and retaining long-term responsibility for operating and maintaining the facility. Typically such a contract extends between twenty-five to fifty years depending on the project. The public sector makes service payments to the concessionaire over the concession period for the availability of the road, and applies payment deductions for poor performance of the asset during the concession period. The service payments typically include a milestone payment at completion of construction plus availability payments during operation.

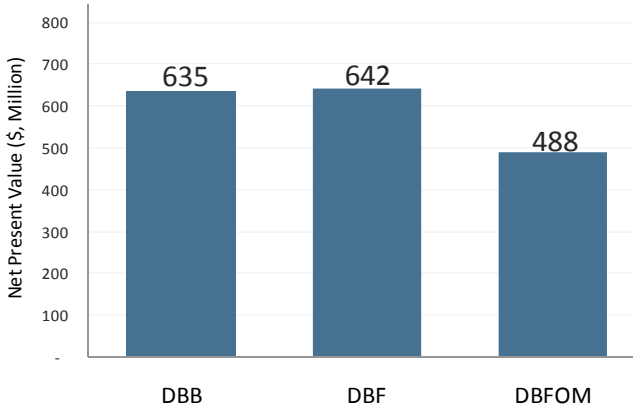
Design-Build-Finance-Operate-Maintain Option Recommended

This report analyzes both qualitative and quantitative characteristics of the three project delivery options and concludes that the DBFOM option better meets the objectives of the Project Sponsors. The DBFOM option is likely to offer the Project Sponsors

- Better Value for Money (VfM) over the life of the Project,
- Optimal risk transfer,
- Greater certainty of cost and schedule at and after financial close,
- Best use of public funds,
- Optimal level of Operations and Maintenance (O&M) service.

As illustrated in Exhibit 2, from the Project Sponsor's perspective the delivery cost using the DBFOM option is more than 20% lower than either of the other two options considered in net present value (NPV) terms.

Exhibit 2: Base Case Project Delivery Costs (NPV)[2]



Source: Arup

[2] NPV accounts for the 60-year maintenance and rehabilitation cash flows discounted at 8.5%. Refer to Appendix G for further explanation.

PROJECT OVERVIEW

For the purposes of this analysis, “the Project” refers to the design and construction of Phase II, originally organized as Contracts 5 through 8, and the operation and maintenance activities of the complete permanent facilities (Contracts 3 through 8).

This report provides a description of the Project and its background. It also describes the roles of the Project Sponsors and funding partners. The delivery options considered are discussed in detail along with their evaluation criteria. The appendices to this report provide additional information and assumptions relevant to the qualitative and quantitative analyses.

Construction Contract Packages

As it was originally planned for traditional delivery using a DBB approach, the Presidio Parkway, Doyle Drive Replacement Project was organized into eight construction contract packages in two phases:

Phase I consists of four contracts:

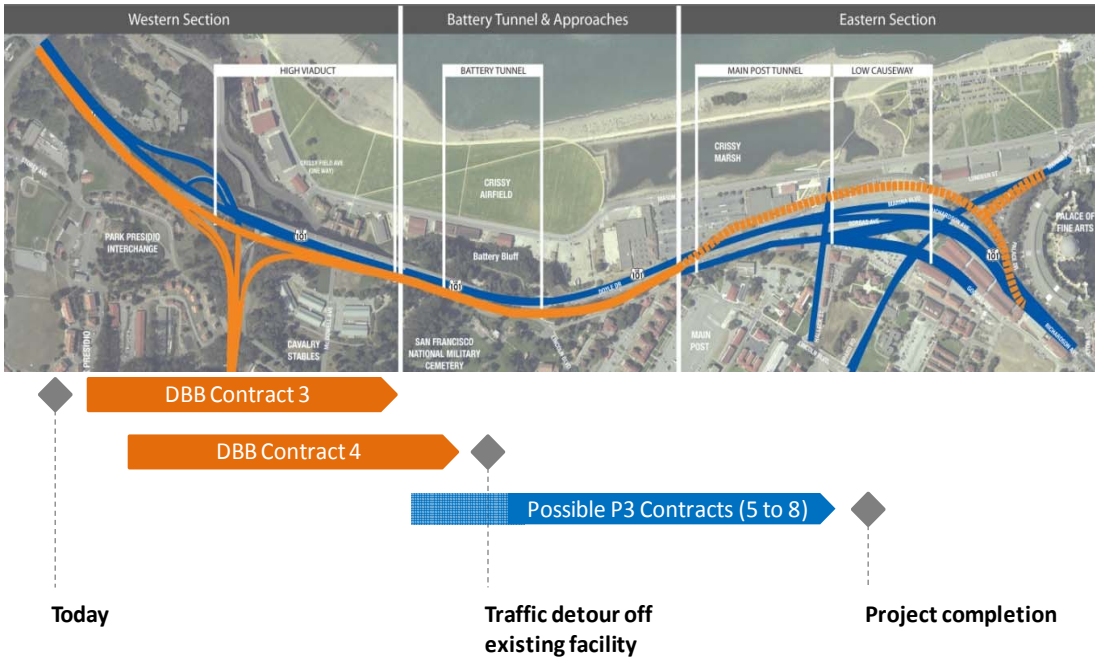
- On-site activities in Contract 1 (Advanced Environmental Mitigation) and Contract 2 (Utility Relocation) commenced in 2009.
- Contracts 3 and 4, shown in orange in Exhibit 3, are being procured under the traditional DBB method. Bids were received for Contract 3 in October 2009 and Contract 4 was advertised in December 2009. All traffic will be detoured to a temporary road upon completion of Contracts 3 and 4. These contracts are expected to be completed in late 2011, when the site would become available for Phase II.

While it is possible to procure Contracts 5 through 8 with a single contract under the traditional DBB method, the analysis did not consider this approach as it is not consistent with how the Project Sponsors intend to procure the construction of Phase II.

Phase II consists of four additional contracts, Contracts 5 through 8, shown in blue in Exhibit 3, which are the subject of this report

- With the completion of Contracts 5-7, expected in 2013, all traffic would be on the permanent replacement facility.
- Contract 8 would complete all landscaping.

Exhibit 3: Project Phasing



Source: Arup/PB

Funding Partners

Additional local funding partners include the following:

- Metropolitan Transportation Commission (MTC)
- Golden Gate Bridge, Highway & Transportation District (GGBHTD)
- Sonoma County Transportation Authority (SCTA)
- Transportation Authority of Marin County (TAM)

GGBHTD operates an independent toll revenue system. The Presidio Parkway is not a tolled facility, nor is it expected to be in the future.

Current Funding Plan

The current funding plan for Phases I and II of the Project was presented in the Initial Financial Plan, which was submitted to the Federal Highway Administration (FHWA) in May 2009. This document includes contributions from the State Highway Operations and Protection Program (SHOPP); San Francisco's local transportation sales tax (Proposition K) scheduled by the Authority; several federal earmarks and other federal sources including stimulus funds; State Transportation Improvement Program funds; State/Local Partnership Funds; GGBHTD funds; and MTC discretionary funds.

EVALUATION CRITERIA AND METHODOLOGY

The DBB option is the base case or Public Sector Comparator (PSC) against which the DBF and DBFOM options are assessed. The options were evaluated qualitatively, against the Department's and the Authority's project objectives, summarized in Exhibit 4 below, and quantitatively, based on international best practice for value-for-money (VfM) analysis. VfM is a tool to help estimate which project delivery option maximizes the public benefit with the resources available. The P3 options (DBF and DBFOM) were compared with the Public Sector Comparator (DBB option) on the basis of a net present value (NPV) calculation of the cash flows from the perspective of the Project Sponsors.

QUALITATIVE EVALUATION

Optimal Risk Transfer

The DBFOM option offers a more extensive and appropriate transfer of risks to the private sector. This option transfers key risks related to construction (such as construction means and methods, construction quality, and long term asset performance) to the party best able to manage them: a private company or concessionaire that has a business model dedicated to deliver these services.

The concessionaire would be responsible for both project delivery and long-term performance to achieve the Project Sponsors' performance specifications for construction, operations, and maintenance. The DBFOM commercial structure, contracts, and financial security packages assist in better aligning the incentives of the concessionaire with those of the Project Sponsors.

Exhibit 4: Delivery Option Objectives

Project Objectives	DBB	DBF	DBFOM
Value for Money over project life	♦	●	■
Risk transfer	●	♦	■
Cost and schedule certainty at and after financial close	●	♦	■
Use of public funds	●	♦	■
Level of operations and maintenance service	♦	♦	■

Key: ■ = Good fit; ♦= Moderate fit; ●= Poor fit

Source: Arup/PB

Exhibit 5: Delivery Options Risk Transfer

Risk categories	DBB	DBF	DBFOM
Construction time overruns	●	■	■
Construction cost overruns	●	♦	■
Maintenance	●	●	■
Operations	●	●	■

Key:
■ = Optimal risk management
♦ = Moderate risk management
● = Sub-optimal risk management

Source: Arup/PB

Under the DBFOM and DBF models, construction contractors are empowered to make decisions necessary to meet project performance goals. In the DBB option, the Project Sponsors retain project risks that are traditionally better managed by the private sector contractor as part of design and construction. The Project Sponsors retain long term performance risk in DBF and DBB options because they hold maintenance and operation responsibilities over the full life of the asset.

The DBFOM option has significantly lower execution risk than the DBF option. This is largely because the former is a widely recognized and well-understood form of delivering projects of the size and complexity of the Project.

Exhibit 5 shows a high level summary of how well the different options manage some of the key project risks.

Construction Cost and Schedule Certainty

Achieving construction cost and schedule certainty is a function of several key characteristics of P3 procurement. These are illustrated in Exhibit 5, and are summarized as follows:

- Management of the risk of cost overruns and late completion is best managed under a DBFOM. The commercial structure of a DBFOM transfers these risks to the concessionaire and its finance providers, who would be responsible for managing the construction subcontractors and delivering the Project on time and within the budget contractually defined at financial close.
- Because of the shift of long-term risk to the private finance providers in a DBFOM scenario, those providers are likely to require a stricter project scope definition and to actively oversee the project delivery to make sure costs are controlled to a greater extent than might be the case in the DBB option. Finance providers are also likely to undertake a more rigorous due diligence regarding the technical and financial ability of the construction and operations contractors to complete their work within the committed Project financing. The financiers will also work to pass down the cost overruns and schedule delays to the appropriate responsible parties because the payments received by the concessionaire from the Project Sponsors are capped and are subject to completion and performance contractual criteria. The private financing used in the DBF option offers better price and schedule certainty than the DBB option, but less than in a DBFOM. This is because the DBB option offers limited involvement of the finance providers in construction oversight, which is similar to the more traditional approach to construction management by the public sector, and the absence of their involvement beyond the end of construction.
- Payments made by the Project Sponsors to the DBFOM concessionaire are directly linked to performance obligations: they occur only when construction is successfully completed, and thereafter are a function of compliance with O&M performance levels set by the Project Sponsors. In the DBF option, progress payments during construction are certified by the public sector construction management oversight team and are linked to completion of the scope of work against traditional prescriptive specifications. Since O&M is performed by the public sector, there is no linkage of payments to long-term performance. There would only be warranties for a limited period of time.
- A construction approach that is based on performance specifications facilitates integration of multiple packages and stages by the contractor and empowers management teams on both sides of the table to make timely decisions. This approach also expedites design and construction.
- A properly designed and executed P3 procurement forces the up-front recognition of the project risks that are responsible for most cost overruns and delays. These risks are thus priced in at the outset by the private sector, which assumes the risks. The public sector retains a smaller set of enumerated risks that the private sector is not best placed to manage (such as force majeure and changes in the law).
- The up-front pricing of project risks enables the Project Sponsors to put in place a comprehensive funding structure and corresponding agreements that define the sharing of risk among them from the outset.

Efficient Use of Public Funds

The DBB option would require the Project Sponsors to meet all construction costs within a three-year construction period. Currently there is a timing difference between some of the previously committed sources of funding and the construction schedule. This could result in construction delays increasing the cost of undertaking the Project and constraining users' benefits. The use of private finance in both the DBF and DBFOM options helps to mitigate this risk by allowing the Project

Sponsors to better match their payments with anticipated revenues over a longer period of time.

Adopting a P3 approach for the Project could create near-term funding program capacity for the State. The policy implications and feasibility of such a reallocation of funds are outside the scope of this report.

Operations and Maintenance Level of Service

A critical infrastructure project like The Presidio Parkway, Doyle Drive Replacement Project—which includes four tunnels and significant bridge structures, and is located in a National Park—has a set of specific O&M needs to ensure a safe, durable, and appropriate facility. These needs are set out in the relevant codes of standard practice in California.

Historically and for the foreseeable future, however, budget constraints have resulted in needed maintenance being deferred. This leads to quality degradation below the established norms and higher total cost for the public when major expenditures for reconstruction or rehabilitation are prematurely required. To a large extent, the Doyle Drive Replacement Project is a result of this condition.

The O&M analysis captures the long-term trade-offs between routine maintenance and rehabilitation for the civil infrastructure. It is based on a 60-year (operational period) analysis horizon that spans the initial 30-year operations phase of the DBFOM concession to provide a more complete picture of rehabilitation requirements for the civil infrastructure. For all three delivery options, the analysis treats high-priority components, such as the tunnel fire and life-safety systems, in the same manner.

The DBFOM option integrates an industry standard asset management approach into the project delivery model. This ensures that:

- The quality of the facility is consistently maintained through a program of preventive maintenance to meet established norms,
- The total cost of achieving this quality is less than in the traditional approach; this equates to $18 million (in NPV terms, 2009$) over the 60-year operational analysis period under a DBFOM procurement as opposed to $23 million (in NPV terms, 2009$) under a DBB or DBF option.

QUANTITATIVE EVALUATION

Methodology

The VfM analysis reflects the following assumptions:

- FHWA Initial Financial Plan, May 2009
- Workshops with the Project Sponsors and industry participants
- Financial and construction market conditions as of November 2009

The methodology used for the analysis, which is based on current practice in the U.S., Canada, United Kingdom, and Australia, is summarized as follows:

- Define procurement options (risk allocation, organizational structure, P3, etc.)
- Identify relevant precedent transactions and conduct market soundings to define a robust set of input assumptions (including inflation rate) and financial structures
- Starting with the baseline design and construction costs in the FHWA Initial Financial Plan, apply a series of cost adjustments to the baseline cost for scope changes, conduct a gap analysis of missing cost line items, and account for cost efficiencies that a design-build contractor may achieve
- Conduct a project-specific analysis of construction and operation risks to estimate risk-adjusted nominal cash flows, including estimates of transaction costs
- Compare the project-specific risk adjustments with the Department, national, and international benchmarks for “optimism bias” to check for reasonability
- Prepare a “shadow bid” financial model with the above inputs, iteratively optimize the financial structure, conduct sensitivity and scenario analyses, and produce outputs in terms of year-of-expenditure cash flows and NPV of the options to compare them on a like basis.

The analysis calculated multiple NPV’s based on a range of discount rates that reflect current practices among public agencies that routinely conduct P3 VfM analyses around the world. The analysis uses a base case discount rate of 8.5 percent, which is based on the Project’s pre-tax, time-weighted Weighted Average Cost of Capital (WACC). This is explained in Appendix G.

NPV is a standard financial analysis technique used to compare costs and benefits over varying time frames

and allows a direct comparison of one-time costs that occur annually.

The quantitative analyses address the following:

- DBB, DBF and DBFOM Payments
- Public Sector transaction costs
- Public Sector uninsured risk

Value for Money Results

As shown in Exhibit 6 below, the DBFOM option has a lower NPV compared with the other two delivery options, by a difference of approximately 23 percent compared with the DBB option.

The DBF option is comparable in cost to the DBB option, with only a marginal difference in NPV cost.

Exhibit 6: Net Present Value (NPV)
(2009$, Million; 8.5% Discount rate)

	DBB	DBF	DBFOM
Oversight and transaction costs	77	50	32
Retained risk reserves	125	91	47
Construction completion payments	369	113	113
Annual availability payments	N/A	324	289
Tax adjustment	36	36	N/A
O&M and Replacement and Rehabilitation	28	28	7
Total net present value	**635**	**642**	**488**

Notes: For the DBFOM option, the O&M/replacement/ rehabilitation costs during the concession terms are included in the annual availability payments. NPV accounts for the 60-year maintenance and rehabilitation cash flows.
Source: Arup

The principal value drivers for the quantitative results are outlined as follows in order of relative importance:

Expected total construction costs at completion: Both P3 options are expected to result in lower total risk-adjusted construction cost because of the approach to managing the Project, the contractual and financial structures that transfer risks and impose discipline on delivery, and expected cost efficiencies for soft and hard construction-related costs.

Construction Risk Analysis: Exhibit 7 indicates the results of the project-specific risk analysis for construction costs in each option.

Exhibit 7: Construction Risk Assessment
(% over baseline cost)

	DBB	DBF	DBFOM
Arup/PB project specific analysis	+29%	+21%	+14%

Source: Arup/PB

The risk adjustments were added to the baseline costs, taken as-is from the FHWA Initial Financial Plan, May 2009. Other adjustments included a 'gap analysis' of costs that were deemed to be missing, feasible cost efficiencies expected in the P3 options, and scope changes registered after May 2009.

The project-specific risk analysis was based on a risk register of four risk groups: interface, site, construction, and other unknowns.

The analysis included risk adjustments for the two P3 options due to the complexity of the Project and the interface risks, such as the requirement for the P3 contractor to assume responsibility for previously completed portions (i.e., Contracts 3 and 4).

Financing costs: While finance costs increase the total amount expended over time, in net present value terms the DBFOM financing structure gives the Project Sponsors a net benefit because the post-tax Weighted Average Cost of Capital (WACC) over the concession term is expected to be lower than the base case discount rate. For the DBF option, which relies on more expensive sources of financing, it is a net cost because its WACC is higher than the public sector discount rate.

Operations and maintenance costs: In a properly funded maintenance program, preventive maintenance reduces future expenditures for rehabilitation and reconstruction. This helps avoid the need for large rehabilitation payments at some point in the life of the Project. In a DBB scenario, maintenance programs tend to be less robust and rehab costs are extensive. These circumstances favor the DBFOM option.

On the other hand, the Department enjoys some economies of scale for operations compared with a private-sector operator because it already operates a large highway network in the region; therefore its marginal cost of operating each additional mile of roadway is relatively small. There currently is no established market for integrated private-sector highway operators in California.

These economies are assumed to be partly offset by the private-sector subcontracting certain tasks that may include subcontracting to the Department itself and/or to the GGBHTD, or certain tasks being retained by the Department altogether. For example, tunnel monitoring is assumed to be retained by the Department since it has an established tunnel monitoring center in the Bay Area.

The net effect is that for O&M, the DBFOM option is more cost-effective than either the DBB or DBF options.

Retained Risk Reserve

In all options, estimates of public sector retained risk reserves have been made to account for those project risks that are retained by the Project Sponsors. For the DBB and DBF options, the retained risk reserves are higher than in a DBFOM option because the risk allocation to the private sector is more extensive in the DBFOM option.

Another important and complementary factor that results in a lower retained risk for the Project Sponsors in the DBFOM option is the limited-recourse financial structure inherent to the DBFOM approach, which imposes a higher degree of discipline on cost containment and more fully aligns the interests of the lenders with those of the Project Sponsors. Because the lenders and the equity investor have significant financial exposure to issues of non-performance, they will conduct extensive due diligence prior to and after financial close, and they will enforce the contractual provisions for liquidated damages, defect warranties, and latent defects warranties in case of inadequate performance by the contractors.

In a DBFOM approach, there are two important requirements to obtain a successful risk allocation and cost containment:

- A robust contractual structure based on successful precedents must be in place that clearly and appropriately allocates the obligations and risks to each party according to their ability to manage them; and
- The Project Sponsors must exercise appropriate oversight of the contractual performance obligations of the DBFOM concessionaire and its contractors such that, on the one hand, the Project Sponsors focus primarily on measuring and enforcing successful outcomes and, on the other hand, the concessionaire and its contractors are able to focus on the means and methods of achieving their contractually obligated successful outcomes.

The DBFOM option would be a clear departure from traditional DBB approach to project delivery and will therefore require an organizational and procedural change to the managing the project delivery process. This will be a key aspect of achieving the value for money and effective risk transfer.

Year of Expenditure Cost of the Delivery Options

The “future value” is the sum of year-of-expenditure (YOE) costs over the analysis horizon of the DBFOM option. These figures include the effect of inflation and are summarized Exhibit 8.

In terms of future value, both P3 options have a higher dollar cost than the DBB option. This is because the former include financing costs that are not explicitly recognized in the latter.[3] Because the analysis of the DBB option does not include public sector financing costs that would likely be incurred, the comparison is somewhat conservative. The financing costs of the P3 options are partly offset by lower expected construction and, in the case of the DBFOM option, lower O&M costs.

An analogy for the use of future value in the context of this report is to compare the options of purchasing a home with all cash up-front and the total cost is only the price paid, versus purchasing it with a 30-year mortgage and the total cost is the price plus the financing costs over the life of the mortgage. The question of which option is better value depends on the purchaser’s preferences with respect to expected future inflation, his or her expectations of future income, and the ability to pay two very different patterns of cash flows especially in the near and medium terms.

Furthermore, unlike the purchase of a home with a given price, the cost of constructing, operating, and

[3] The FHWA does not require project financial plans to consider financing costs. The Initial Financial Plan, May 2009, for Doyle Drive is no exception – however, at least some of the funding partners would incur financing costs to meet their funding commitments. Because no financing costs are considered in the analysis, it is conservative with respect to the comparison of the P3 options versus the DBB option.

maintaining a complex project such as the Presidio Parkway, Doyle Drive Replacement Project is subject to considerable risks, and each of the three delivery options manage the risks in different ways.

For these reasons, it is standard practice in investment analysis to compare the options on a like-for-like basis by discounting the risk-adjusted cash flows at the appropriate discount rate. In the case of public infrastructure that conveys social and economic benefits to society, in addition to the appropriate adjustment of cash flows for the Project's risks, the public investment analysis typically accounts for other externalities such as the effect of taxes or the displacement of investment and consumption.

DBB Payments

Because of the accelerated project schedule, all required funds, including cost overruns, would likely need to be made available by 2013.

Additional O&M payments would be needed to reflect such ongoing costs. Collectively, these O&M costs total $128 million (YOE$) over the 33 year concession term considered in this report. Since the O&M analysis period is for 60 years, over the remaining time period these O&M costs total an additional $417 million.

DBFOM Payments

The "shadow bid" financial model determines the availability payments that are consistent with the input assumptions. The availability payment consists of a flat portion to reflect the fixed construction and financing costs, and an index-linked portion to reflect the Project Sponsors' retention of the inflation risk attributable to the O&M portion of the availability payment. The Project Sponsors requested this approach for consistency with expectations regarding the profile and pattern of the future obligations by the State.

The annual availability payments are estimated at $35 million (YOE$) commencing in 2014 and gradually increase up to an estimated $40 million (YOE$) prior to the end of the concession in 2043.

Exhibit 8: Total Year-of-Expenditure Costs
(YOE$, Million)

	DBB	DBF	DBFOM
Oversight and transaction costs	96	61	51
Retained risk reserves	125	91	47
Construction completion payments	458	150	150
Annual availability payments	N/A	640	1,130
Tax adjustment	167	167	N/A
O&M and R&R through 2043	128	128	N/A
Total sum of nominal dollars (concession term, 2010 to 2043)	**974**	**1,237**	**1,378**
O&M and R&R from 2044 to 2073	417	417	591
Total sum of nominal dollars (2010 to 2073)	**1,391**	**1,654**	**1,969**

Note: for the DBFOM option, the O&M/R&R costs during the concession terms are included in the annual availability payments.
Source: Arup

The O&M component of the availability payment averages 15 percent over the 30-year operations term and increases gradually over that period of time with inflation, which is assumed to be 2.2% per annum.

Transaction and Oversight Costs

The oversight and transaction costs for the DBB and DBF options are expected to be higher than in the DBFOM option. This is because in both the DBB and DBF options the Project Sponsors would be responsible for a traditional approach to monitoring and approving design and construction at every stage. In the DBFOM option, by contrast, the concessionaire assumes more of this responsibility, subject to the oversight by the Project Sponsors for compliance with the performance requirements of the concession agreement. The respective costs have been accounted accordingly.

CONCLUSION

This report provides analyses of both qualitative and quantitative characteristics of the three project delivery options considered and concludes that the DBFOM option is likely to offer:

- Greater VfM over the project investment horizon,
- Optimal risk transfer,
- Greater certainty of construction cost and schedule,
- Better use of public funds and resolves cash flow risks associated with the traditional pay-as-you-go approach,

- Optimal level of O&M service.

A number of key requirements must be satisfied to successfully achieve these goals:

- A clear definition of the Project from the outset, appropriate incentives, and appropriate mechanisms for the parties to maintain discipline with respect to subsequent changes to the scope and/or performance requirements
- Definition and implementation of an appropriate risk allocation model based on assigning risk to the party that is best positioned to manage it
- A competent approach to managing the process based on international best practices for performance standards, approach to construction and O&M oversight, and project management methods that support timely decision making and predictable processes
- Definition and implementation of a robust contractual structure to support the above objectives
- Timely and comprehensive approach to the SB4 approvals process
- Development of transparent and unambiguous reimbursement agreements among the the funding partners that address the parties' objectives while minimizing the potential for appropriation challenges
- Providing the concessionaire with the strongest possible payment counter-party to minimize financing costs

In conclusion, the Design-Build-Finance-Operate-Maintain (DBFOM) option better meets project and Project Sponsors' needs for Phase II of the Presidio Parkway, Doyle Drive Replacement Project.

Chapter 1:

Introduction

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1.1 PURPOSE

On behalf of the Department and the Authority, the Consultant Team has been retained by the Authority to provide an initial review and assessment of the construction and service delivery options available for the procurement of the Presidio Parkway, Doyle Drive Replacement Project. For the purposes of this analysis, "the Project" refers to the design and construction of Phase II, originally organized as Contracts 5 through 8, and the operation and maintenance activities of the complete permanent facilities (Contracts 3 through 8).

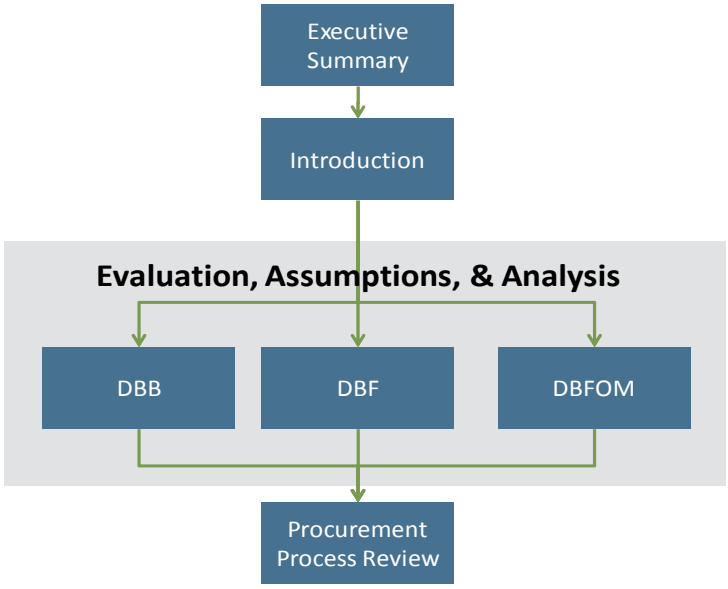
In this report, the Department and the Authority are referred to jointly as the Project Sponsors. Additional funding partner, the funding partners include the following:

- Metropolitan Transportation Commission (MTC)
- Golden Gate Bridge, Highway & Transportation District (GGBHTD)
- Sonoma County Transportation Authority (SCTA)
- Transportation Authority of Marin County (TAM)

1.2 ANALYSIS METHODOLOGY

The approach to the analysis, as reflected in this report, was structured as follows.

Exhibit 9: Report Structure



Source: Arup

Exhibit 10: Presidio Parkway Location

Source: CirclePoint

1.3 BACKGROUND

1.3.1 A Critical Link

The Presidio Parkway, a 1.5-mile portion of US 101, provides the southern access to the Golden Gate Bridge from San Francisco. Exhibit 10 shows the general location of the Project on the north side of San Francisco.

The Presidio Parkway and the Golden Gate Bridge connect Marin and San Francisco Counties and are an indispensable regional link between the City and County of San Francisco and the North Bay Area counties. In addition, the Presidio Parkway provides access to the Presidio of San Francisco (Presidio), a former U.S. Army base that is now part of the federally designated Golden Gate National Recreational Area (GGNRA), and to the historic Palace of Fine Arts.

The Presidio Parkway serves as a primary north–south link in Northern California and is a critical link for many commuters working in San Francisco. There are approximately 120,000 vehicle trips per weekday on the Presidio Parkway. It also provides access for non-work trips for tourists and residents between San Francisco and counties to the north, such as Sausalito, Sonoma, and Napa.

The existing Presidio Parkway structures, built in 1936, do not meet current highway design standards and are seismically deficient. Retrofits have addressed safety concerns in the short-term, but a replacement of these structures is required.

The Presidio Parkway is designated as a regional post-disaster recovery route. An interruption of the traffic flow following a major earthquake would sever the principle connection to the Golden Gate Bridge. This would result in major congestion impacts on the regional transportation network, and would have profound effects on regional transit, ferry services, freeway systems, and local streets on the Peninsula and in the East Bay. The near-term economic costs associated with such post-disaster peak period travel delays are an estimated $1.4 million per

day for the region, or about $420 million per year (2008$). Although travel patterns would adjust to reduce the post-disaster delays, the elimination of beneficial travel to and from San Francisco, and the resulting economic loss, would have an enduring impact on the local and regional economy.

1.3.2 Description of the Construction

On December 18, 2008, the FHWA issued the Federal Record of Decision formally approving the Final Environmental Impact Statement / Report (FEIS/R) for the project in accordance with the NEPA. The FEIS/R summarizes the Project's objectives as follows:

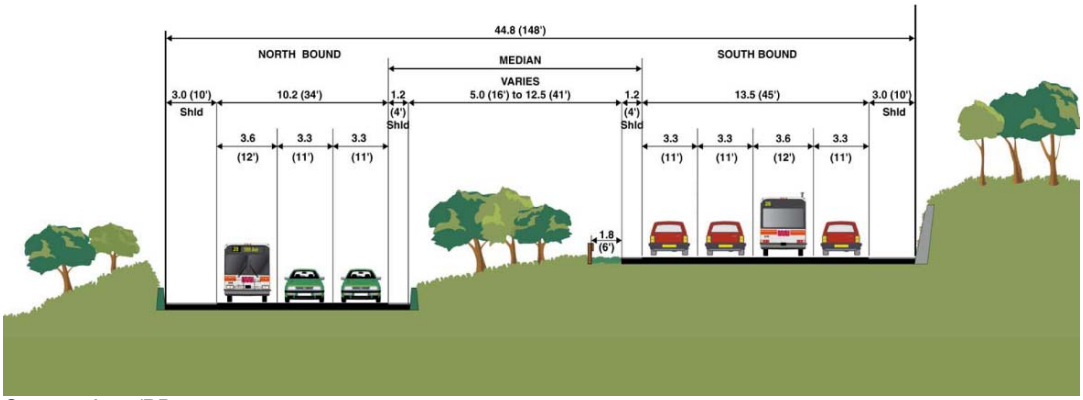
> *Improve the seismic, structural, and traffic safety of the roadway within the setting and context of the Presidio of San Francisco and its purpose as a National Park.*

This action cleared the way for completion of the final design, initiation of right-of-way acquisition, and the beginning of the construction phases. The design option advanced for construction is known as the Refined Alternative in the FEIS/R. The Refined Alternative, a new six-lane facility with a southbound auxiliary lane, will replace the existing facility between the Park, the Presidio Interchange, and a new access point to the Presidio at Girard Road. A cross-section of the new six-lane facility is shown in Exhibit 11.

The Project features wide landscaped medians and includes a high viaduct, two short tunnels, and a low causeway. To minimize impacts on the Presidio, the footprint of the new facility will overlap with a large portion of the existing facility's footprint east of the Park Presidio Interchange. Construction is expected to take place between 2009 and 2013.

A high viaduct structure will be constructed between the Park Presidio Interchange and the San Francisco National Cemetery. Shallow tunnels (Battery Tunnels) will extend past the cemetery to the east of Battery Blaney. From Building 106 (Band Barracks), tunnels (Main Post Tunnels) will extend to the east of Halleck Street. The facility will then rise slightly on a low causeway over the site of the proposed Quartermaster's Reach Restoration Project and will pass over Girard Road, which will be slightly depressed to lessen the vertical visual intrusion of the project at that point. East of Girard Road, the facility will return to existing grade north of the Gorgas warehouses and will connect to Richardson Avenue. The facility will include a transition zone, starting from the southbound Main Post Tunnel, to reduce the speeds of vehicles before they enter city streets. Direct access to the Presidio and to Marina Boulevard will be provided in both directions via Girard Road. New entrance and exit ramps will be constructed.

Exhibit 11: Doyle Drive Project Cross Selection



Source: Arup/PB

East of the new Letterman garage, Gorgas Avenue will be a one-way street with a signalized intersection at Richardson Avenue. North of Richardson Avenue, Lyon Street will remain in its existing configuration and will provide access to Palace Drive.

1.3.3 Appropriated Funds for Work

In May 2009, the FHWA approved the Initial Financial Plan with funding from twelve different federal, state, and local agencies in the amount of $928.8 million (year-of-expenditure dollars, or YOE$), of which $879 million is currently committed. It is uncertain when additional federal, state, and local funds will be available.

1.3.4 Contractual Division of Work

The Presidio Parkway, Doyle Drive Replacement Project was divided into eight contract packages. The purpose was two-fold: (1) to permit acceleration of construction of the project according to the identified construction staging approach, and (2) to increase competition by dividing the project into multiple, smaller construction contracts that could be bid on individually and separately. The key project dates are shown in Appendix A1.

On-site activities in Contract 1 (Advanced Environmental Mitigation) and Contract 2 (Utility Relocation) have already started. Contracts 3 and 4 are being processed under the traditional DBB method. Seismic safety will be achieved with a temporary facility upon completion of Contracts 3 and 4.

A high viaduct included in Contract 3 and the Battery tunnel in Contract 4 will form part of the permanent facility. Bids were received for Contract 3 in October of 2009.

The design and construction of the assets procured under Contracts 5 through 8, together with the operation and maintenance activities associated with the new facility (including construction works undertaken in earlier contract packages 1 through 4), reflect the current scope of work as defined by the Project Sponsors, and is summarized in Exhibit 12.

Exhibit 12: Doyle Drive Project Contract Packages

Legend

- **Contract 1:** Environmental mitigation-will be on going (not depicted on the map)
- **Contract 2:** Utility relocation (not depicted on the map)
- **Contract 3:** Permanent Roadway Section, Southbound High Viaduct, Southern Park Presidio Interchange Ruckman Undercrossing
- **Contract 4:** At-Grade Detour, Southbound Battery Tunnel, Permanent Roadway Section, Electrical and Mechanical Substation, Retaining Walls, Traffic Switch, Full Weekend Closure, Demolish Existing Low Viaduct
- **Contract 5:** Main Post Tunnels, Northbound Battery Tunnel, Electrical and Mechanical Substation, Traffic Switch (Full Weekend Closure)
- **Contract 6:** Girard Road Undercrossing, Low Viaduct
- **Contract 7:** Northbound High Viaduct, Northern Park Presidio Interchange, Northbound Roadway to Merchant Road, Demolish Existing High Viaduct
- **Contract 8:** Landscaping (not depicted on the map)

Source: Circle Point

Chapter 2:

Evaluation

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2.1 OBJECTIVES

The Project Sponsors have tasked the Consultant Team with providing an initial review and assessment of the construction and service delivery options available for the procurement of the Project, as authorized under Senate Bill 4 (SBX2 4, Cogdill, 2nd Extraordinary Session) adopted in February of 2009 (herein referred to as SB4). In particular, the Project Sponsors seek a procurement method that will offer the following:

- The best VfM over the life of the Project
- The optimal transfer of risk to the private sector
- The greatest possible certainty of cost and scheduling
- The best use of public funds
- An optimal level of O&M

An additional goal is to reallocate public funds to other unfunded or underfunded projects. The benefits and policy implications of this goal are beyond the scope of this report.

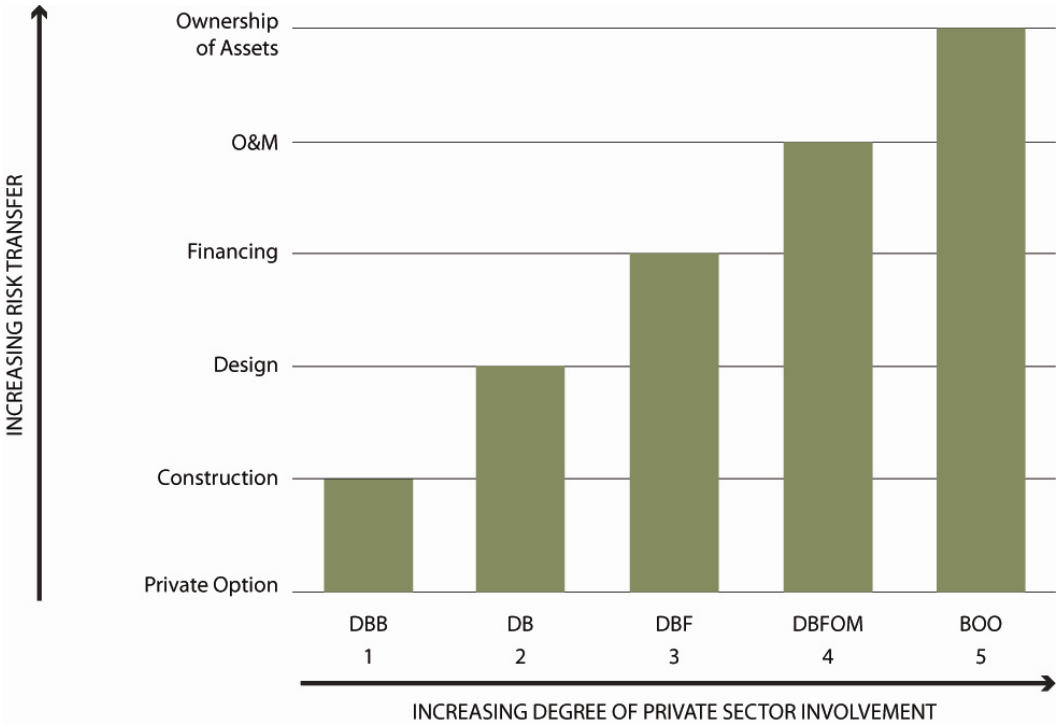
2.2 DELIVERY OPTIONS CONSIDERED

There is a range of Public-Private Partnership (P3) project delivery options and possible levels of private sector involvement and therefore a range of risk transfer:

- Traditional Design-Bid-Build (DBB): public design and finance, private construction contracts
- Design-Build (DB): public finance, private design and construction contracts
- Design-Build-Finance (DBF): private finance, design and construction contracts
- Design-Build-Finance-Operate-Maintain (DBFOM): private finance, design, construction, and O&M (but public ownership of the assets)
- Build-Own-Operate (BOO): similar to DBFOM, but with permanent transfer of ownership of the asset to the private sector

The following exhibit graphically depicts the extent of private sector involvement in each delivery option.

Exhibit 13: Range of Private Sector Involvement



Source: Arup

The Project Sponsors have asked the Consultant Team to compare the traditional public-sector procurement (DBB) with the DBF and DBFOM P3 delivery options. If selected, either of these P3 delivery options would be implemented in accordance with California law and with the new authority provided under SB4.

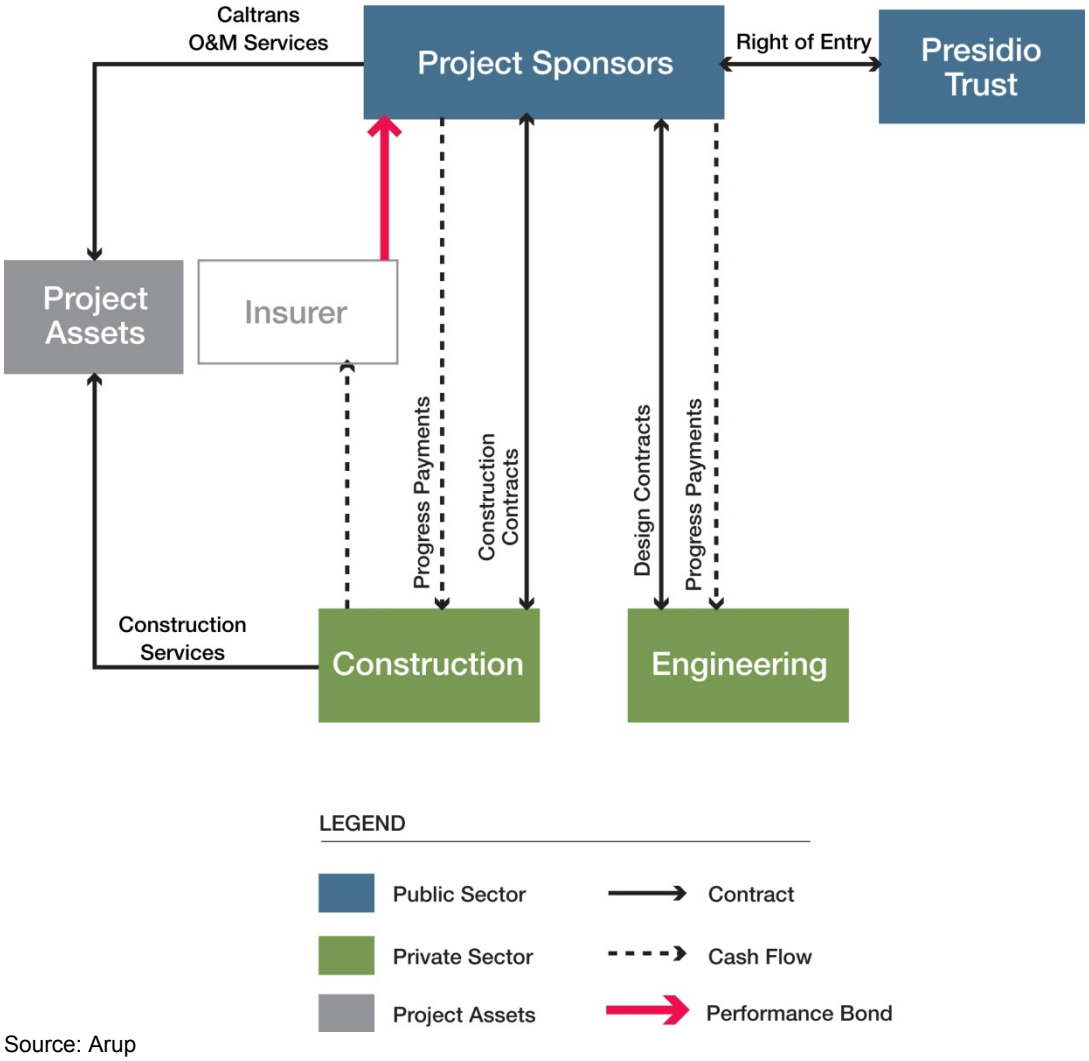
2.2.1 Design-Bid-Build

DBB is characterized by an asset designed under separate contracts by the private sector in accordance with a public sector output specification. However, the asset is financed, owned, operated, and maintained by the public sector.

DBB is the traditional method of project delivery used by the Department. Under a DBB project, after the design and the construction contract documents are completed, the Department then advertises the construction contract in a bid process. The Department then awards a unit price construction contract for delivery of the project. The public sector is responsible for construction oversight and traditionally pays for construction through invoices against completed work.

At the end of construction, the public sector assumes responsibility for operating, maintaining, replacing, and rehabilitating the asset over its remaining asset life, subject to warranty and latent defect provisions in the construction contract as provided by law. A diagram of the contractual relationships is shown in Exhibit 14.

Exhibit 14: Indicative DBB Commercial Structure



Source: Arup

2.2.2 Design-Build-Finance

DBF is characterized by an asset that is designed, constructed, and financed by a private sector entity or consortium in accordance with a public sector output specification. The asset is subsequently owned, operated, and maintained by the public sector.

DBF delivery methods have been successfully used to deliver highway projects, e.g., Florida's I-75 project. In DBF procurements, the public sector runs a competitive bid and awards the contract to a single construction contractor to complete project design and construction for a fixed price, subject to risks retained by the public sector.

In DBF procurements, the public sector also retains design oversight and is responsible for construction oversight and certification at final acceptance of the asset (at the end of construction).

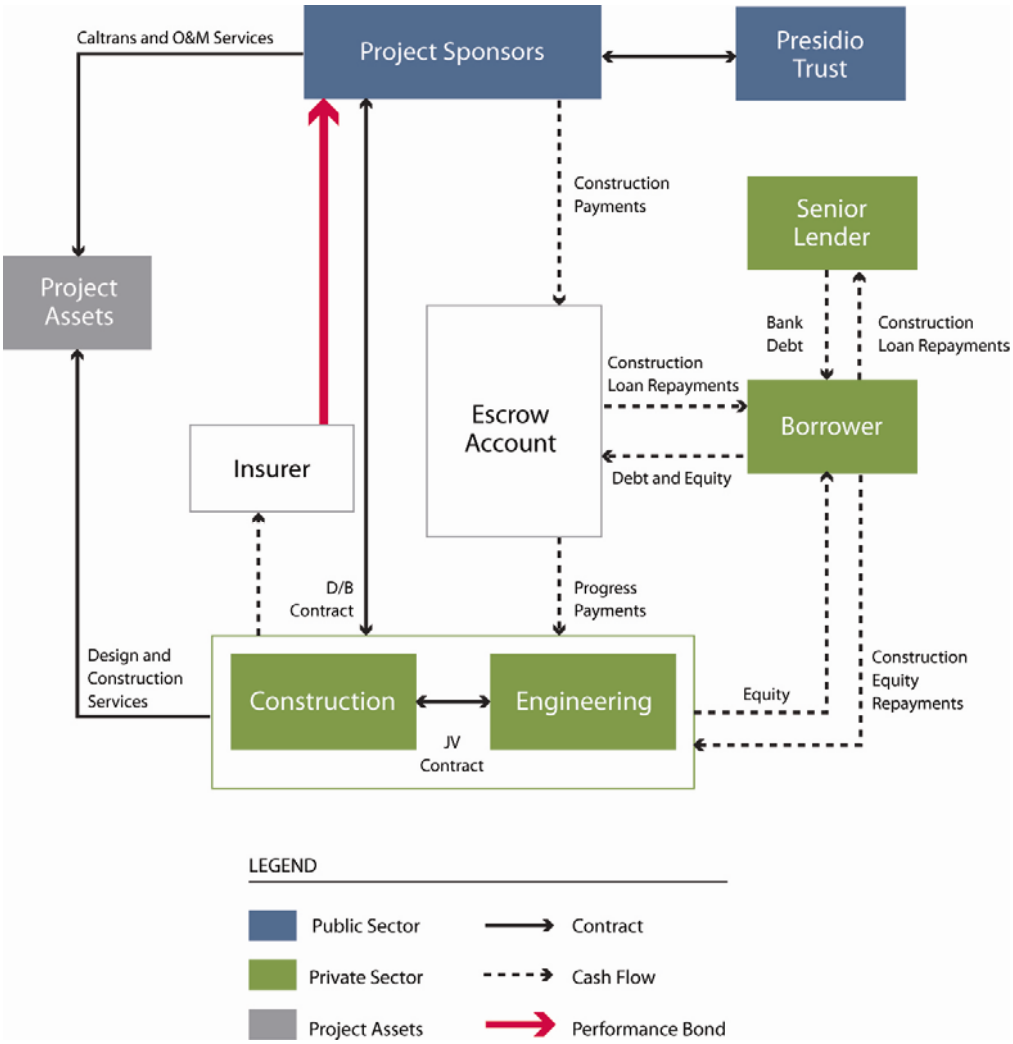
A distinctive feature of DBF procurement, as compared with conventional DBB procurement, is the requirement of the construction contractor to arrange private financing to fund design and construction throughout the design and construction periods. The construction payments to the contractor are released from a trustee account controlled

by the private lenders, the public sector, and the construction contractor, following approval by the public sector of monthly invoices against completed work.

The public sector has a non-contingent obligation to make payments to the private lenders for work completed and approved by the public sector. Payments are in accordance with a predefined payment schedule or as a lump sum; these are defined upfront when the project is bid.

At the end of construction, the public sector assumes responsibility for operating, maintaining, replacing, and rehabilitating the asset over the remaining asset life. A diagram of the contractual relationships is presented in Exhibit 15.

Exhibit 15: DBF Contractual Arrangement



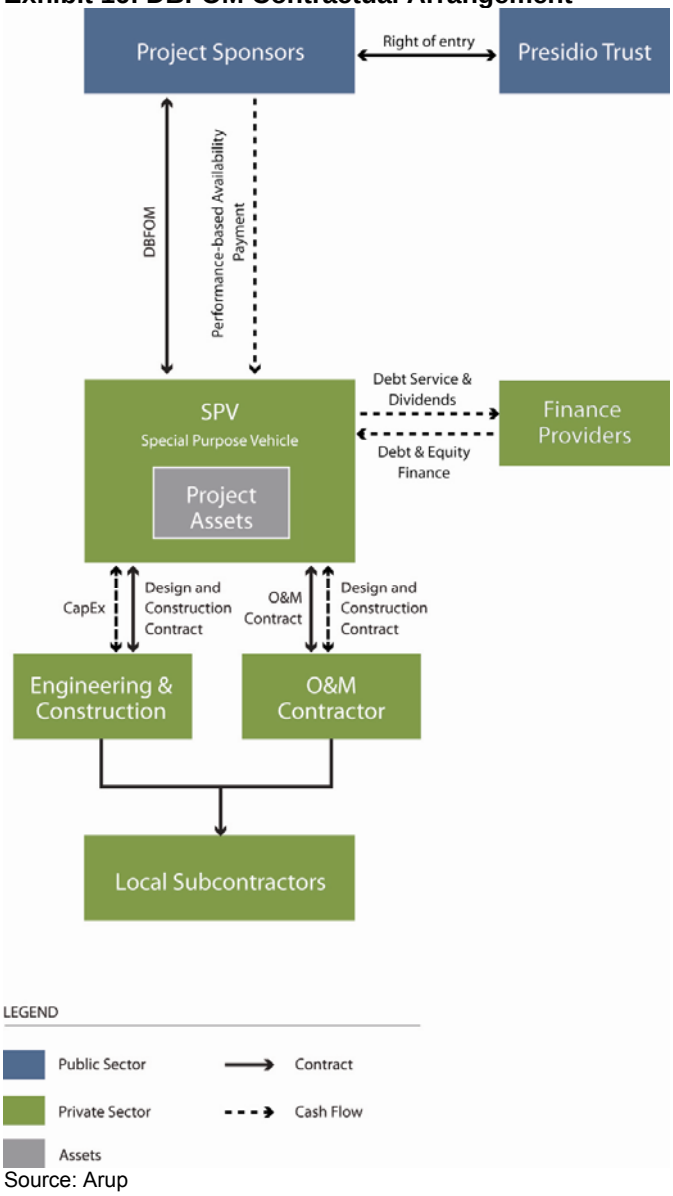
Source: Arup

2.2.3 Design-Build-Finance-Operate-and-Maintain

DBFOM is characterized by the private sector providing design, build, construction, operation, and maintenance services to the public sector in accordance with an output specification. The output specification defines the minimum performance levels that the public sector requires and covers all aspects of the project. The private sector is responsible for performing to the contractually required output specification.

In this report, the DBFOM procurement model is based on availability payments made by the public sector to the private sector in exchange for the services provided. Exhibit 16 illustrates the relationship among the parties in a DBFOM procurement model.

Exhibit 16: DBFOM Contractual Arrangement



Source: Arup

DBFOM procurements using the availability payment mechanism have been used recently for delivery of the I-595 Managed Lanes project and Port of Miami Tunnel projects in Florida. Other examples include the recently completed Sea to Sky Highway and Okanagan Lake Bridge, in British Columbia, Canada (both in operation); the recently completed first phases of the Stoney Trail and Anthony Henday highways in Alberta, Canada (both in operation); and multiple projects in Europe.

In a DBFOM project, the public sector runs a competitive bid process and awards the contract to a DBFOM concessionaire to furnish an asset that performs to the specified standard defined by the output specifications. The contract is over a defined time period (the concession term) for a fixed price, and is subject to certain risks retained by the public sector.

The private sector DBFOM concessionaire normally establishes a Special Purpose Vehicle (SPV) or Special Purpose Entity (SPE), which is responsible for subcontracting and managing design, construction, and O&M contracts. These are each managed through separate fixed-price sub contracts for each project element. The DBFOM concessionaire is also required to raise private financing to fund construction.

Because of the nature of the contractual relationship, the public sector provides limited oversight during design, construction, operations, and maintenance. This limited oversight includes monitoring the performance of the private sector against predefined performance indicators throughout the concession term.

The public sector makes fixed or escalating availability payments to the DBFOM concessionaire over the concession term to compensate for the cost of constructing, financing, operating, and maintaining the underlying project assets. The availability payments are subject to deductions that can be assessed by the public sector for failure by the private sector to perform to the predefined output specifications (such as incident management, response time, lane closure, tunnel lighting and ventilation, and timely completion of maintenance and rehabilitation activities).[4]

2.3 METHODOLOGY

2.3.1 Quantitative Evaluation

The quantitative assessment in this report of VfM compares the whole life cost of the Project from the point of view of the Project Sponsors under the three delivery options considered. This comparison, using the shadow bid method, provides the basis for a quantitative evaluation of the three procurement methods.

For this report, a financial model was developed to capture the Project costs as they would accrue under the different delivery options, and to determine the cost for the residual risk retained by the public sector for each delivery option.

A public sector base case for the Project was developed from the estimated project costs of a traditional DBB option. This is referred to as the "Public Sector Comparator" (PSC), a term commonly used in related literature.

The **DBB model**, which establishes the public sector benchmark for comparison with the two other alternative P3 options, includes the following:

- Estimated risk-adjusted construction costs for completion of the Project
- Estimated costs of operations, maintenance, and long-term replacement and rehabilitation (R&R) under public sector management

[4] When the asset performance measures associated with these pre-determined conditions are met, the system is said to be "available," and the corresponding availability payments are made. When these conditions are not fully met, the availability payments are reduced as defined by the rules in the contract with reference to the actual level of performance. The contractual rules that govern these deductions and other features of the availability payments are called the "payment mechanism."

- Estimated public sector transaction costs and retained public sector risk

The **DBF model** includes the following:

- Estimates of milestone and availability payments that cover the following costs incurred by the private concessionaire:
  - Estimated risk-adjusted construction costs, adjusted by allocations of risk and responsibilities appropriate for this option
  - Estimates of the effects of financing costs associated with the proposed milestone payment and subsequent repayments
- Estimated risk-adjusted costs of O&M and R&R under public sector management
- Estimated public sector transaction costs, including an estimated allowance for retained public sector risk

The **DBFOM model** includes the estimates of milestone and availability payments, which cover the following costs incurred by the private concessionaire:

- Estimated risk-adjusted construction costs that reflect this option's responsibility allocation
- Estimates of the effects of financing costs associated with the proposed milestone payment and subsequent availability payments
- Estimated risk-adjusted costs of O&M and R&R under private sector management over the 30 year operations period
- Estimated public sector transaction costs, including an estimated allowance for retained public sector risk

In all three cases, the risk adjustments to design, construction, O&M, and R&R costs were based on a responsibility and risk allocation matrix developed through a series of workshops with the Project Sponsors and market soundings with U.S.–based construction contractors. The bases of the risk adjustments made to each procurement option are discussed in greater detail in Section 3.

The financing and tax assumptions used to develop the DBF and DBFOM base cases were derived from publically available information on recent DBF and DBFOM transactions in the United States and from informal market soundings with U.S.–based P3 lenders and equity investors. The assumptions used to develop the three base case models are detailed in Section 3.

The NPV of the risk-adjusted, life-cycle costs under each procurement option were compared, to evaluate which procurement option offers the Project Sponsors the best VfM. The quantitative results are presented in Section 4.

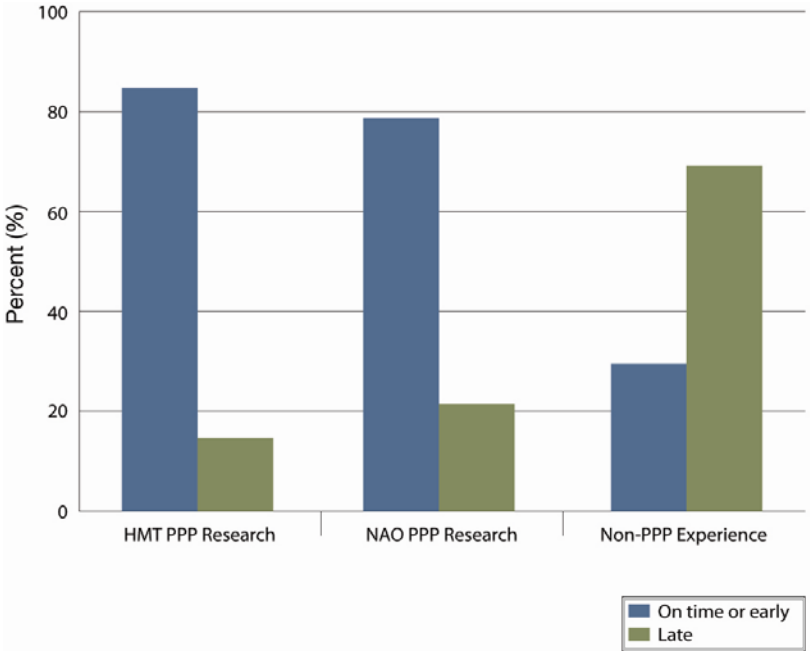
2.3.2 Qualitative Evaluation

The quantitative analysis does not consider all the costs and benefits of the delivery options. Aspects that are difficult to measure in cash flow terms have, therefore, been considered in a qualitative analysis:

- VfM over the life of the project
- Optimal risk transfer
- Greater certainty of cost and schedule at and after financial close
- Best use of public funds
- An optimal level of O&M service

A DBFOM would best deliver against these qualitative criteria. A DBF provides greater incentive than a DBB (but less than a DBFOM) for on-time completion, as the banks would want to ensure that construction milestones are certified and payments made on schedule by the Project Sponsors. The United Kingdom Treasury and National Audit Office independently compared the performance of traditional and DBFOM procurement options in their programs, as shown in Exhibit 17.

Exhibit 17: UK PPP vs. Traditional Delivery Experience



Source: United Kingdom HM Treasury, "PFI: Meeting the Investment Challenge," July 2003.

The O&M of the facility would be budget constrained under the DBB and DBF options, and this would likely result in lower availability and service quality than would be the case with the DBFOM option.

The DBFOM offers the greatest long-term price certainty and advantages in the current competitive construction industry environment. The quantitative analysis in Section 3 is based on November 2009 financial market conditions, which could potentially ease before the financial close of any P3 transaction. Because long-term construction cost projections are uncertain, fixed-cost contracts are preferable to hedge against unforeseen price spikes.

Construction cost and schedule certainty are among the most important of the qualitative factors for the Project Sponsors and for potential P3 bidders. As the DBF and DBFOM approaches transfer the risks associated with financing to the private sector, the bidders will be reluctant to accept uncertainties in scope, cost, schedule, or outcome unless those uncertainties can be priced into the transaction, otherwise mitigated, or transferred to another party (either by the Project Sponsors retaining a particular risk or by the P3 concessionaire obtaining insurance for it).

Achieving construction cost and schedule certainty is a function of several key characteristics of P3 procurement:

- Risks are allocated to the parties that are best able to manage them; the allocations are contractually locked into the organizational structure and backed by robust turn-key contracts, financial security packages, and alignment of incentives for the parties to perform their intended functions. The DBFOM achieves greater appropriate risk transfer to the private sector.
- Due diligence performed by private-sector financing providers determines the technical and financial ability of the contractors to complete their work within a given budget and ensures that the responsibility of any cost overruns or schedule delays is passed down to the contractors. This is a particular strength of the DBFOM option given the more robust "project finance" structure of the model.

- Payments made by the Project Sponsors to the DBFOM concessionaire are directly linked to performance obligations—payments are made only when construction is successfully completed and thereafter only when specific O&M performance levels are met. In the DBF option, progress payments during construction are certified by the public sector oversight team and are linked to completion of the scope of work against traditional prescriptive specifications. However, because O&M are performed by the public sector, there is no linkage of payments to long-term performance. In this regard, therefore, DBFOM is the superior option.
- A construction approach that is based on performance specifications facilitates the integration of multiple packages and stages by the contractor, empowers management teams on both sides of the table to make timely decisions, and expedites design and construction.
- A properly designed and executed P3 procurement forces the up-front recognition of the project risks that are responsible for most cost overruns and delays. These risks are thus priced in at the outset by the private sector, which assumes the risks. The public sector retains a smaller set of enumerated risks that the private sector is not in the best position to manage (such as force majeure and changes in the law).
- The up-front pricing of project risks enables the Project Sponsors to put in place a comprehensive funding structure and corresponding agreements that define the sharing of risk among them from the outset.

A DBFOM would provide the greatest certainty of on-time completion. Empirical evidence of this is provided by the UK Treasury and the UK National Audit Office, who independently compared the performance of traditional and Public/Private partnerships (PPP, or P3) procurement options in their program, confirming this result. Exhibit 17 (on page 15) illustrates these findings.

A DBF provides greater incentive than a DBB (but less than a DBFOM) for on-time completion, as the lenders' interests are aligned with the Project Sponsors to ensure that construction milestones are certified and payments are made by the Project Sponsors on schedule.

The presence of long-term private financing, which imposes certain financing costs on the Project, has important benefits in terms of greater certainty of cost and quality outcomes. They include the following:

- The payments made to the DBFOM concessionaire over the 30 years of operations are directly linked to performance of the asset; this gives the concessionaire incentive to build, operate, and maintain the asset properly.
- The availability payment structure provides an effective mechanism to measure performance and to link it to payments.
- Providers of financing to the DBFOM concessionaire impose discipline on the design-build and O&M contractors working for the concessionaire via (a) robust pass down of risks; (b) commercially robust contractual structures including enforceable liquidated damages, security packages, and warranty provisions; and (c) due diligence of the proposals (legal, technical, and financial). The financing structure in the DBFOM option includes the key elements to impose this discipline, to manage the risk, and to absorb residual risks that are inside the concession structure and are not passed down.

Unlike the DBFOM structure, where discipline is imposed by banks and by the Project Sponsors, the discipline for the DBF contractor is imposed primarily by the Project Sponsor during construction as the purchaser of the asset. The DBF contractor is not responsible for long-term performance or for O&M services. In this option, the Project Sponsors perform a similar role in managing the contractor during construction, including authorizing payments, conducting inspection and quality audits, and accepting the works. Consequently, in the DBF option, more of the construction and performance risks are retained by the Project Sponsors.

Chapter 3:

Risk Analysis and Cost Assumptions

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3.1 CONSTRUCTION COST

The Consultant Team conducted workshops with the Department and experts from the design-build industry, with construction risk analysts, and with construction practitioners to assess the construction costs and risk premiums applicable to the Project under the DBB, DBF, and DBFOM options. Specifically, the workshops reviewed the methodology and assumptions used to calculate the capital costs and the associated risk premiums.

3.1.1 Outline Methodology

For each delivery option, the starting point of the analysis was the initial FHWA Initial Financial Plan, as of May 2009. The baseline capital cost for the Project (i.e., for the work previously planned to be completed under Contracts 5 through 8) is $499 million in 2009 dollars.

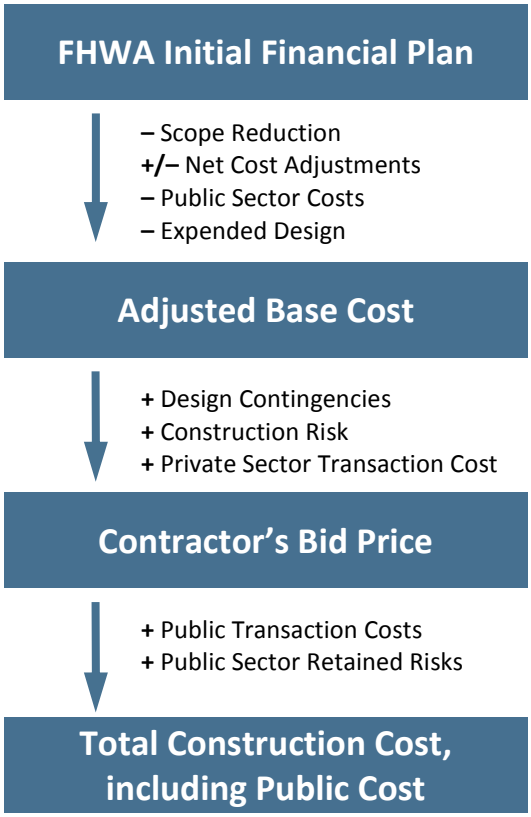
A series of adjustments were made to this base cost to arrive at an Adjusted Base Cost for each option. These adjustments reflect changes to the scope of the Project, additional costs not considered by the FHWA Plan, costs that were removed because they were not included in a contractor's bid price (including costs that will be borne by the public sector), and costs that have already been spent on the Project to date. This produces the Adjusted Base Cost, which is different for each of the three options, DBB, DBF, and DBFOM.

Next, a project-specific risk analysis was conducted for each delivery option. This analysis reflects the risk elements assumed by the private sector in each option. The dollar amounts associated with these risks are added to the Adjusted Base Cost to produce a Contractor's Bid Price.

Finally, the costs incurred by the public sector in each delivery option were assessed and added to the Contractor's Bid Price, to create a Total Construction Cost including Public Costs. This includes an assessment of the risks retained by the public sector in each option, and the likely costs associated with those risks.

Exhibit 18 illustrates the methodology used. The dollar values attributed to each adjustment are discussed in detail in the following sections.

Exhibit 18: Construction Cost Methodology



Source: Arup/PB

3.2 ADJUSTED BASE CONSTRUCTION COST

The following adjustments to construction costs in the FHWA Initial Financial Plan were assessed:

- **Scope reductions –** the scope of the work previously planned to be performed under Contracts 5–8 has changed slightly since the FHWA Initial Financial Plan was drafted
- **Net cost adjustments and efficiencies –** the results of a gap analysis highlighting costs necessary to complete the scope that were not accounted for in the FHWA Initial Financial Plan and efficiencies that a design-builder could generate under the DBF and DBFOM options
- **Public sector costs –** in the DBF and DBFOM options, certain functions will be carried out by the public sector, but the cost of these options will not be included in a finance solution, so the costs are removed
- **Expended design –** a portion of costs included in the FHWA Initial Financial Plan have already been incurred; in order to produce a comparison of costs going forward, these costs have been removed

These adjustments are discussed in detail in this section.

3.2.1 Scope Reductions

Two items of scope have been removed from contracts 5 through 8, thus reducing their cumulative cost. As the scope of work is the same for all delivery options, the effect on the construction costs of the DBB, DBF, and DBFOM options are the same. The items of scope removed are:

- The Underground Parking Garage previously included in Contract 5 was removed from the scope as it is now part of a separate agreement with the Presidio to mitigate lost parking spaces (an adjustment of $14 million),
- The bridge demolition work previously in Contract 5 was removed from the scope as it is now part of Contract 4, which is currently being procured in the traditional approach (an adjustment of $23 million).

The total scope reduction is shown in Exhibit 19.

3.2.2 Net Cost Adjustments and Efficiencies

The Consultant Team conducted a gap analysis which exposed a number of costs that would be necessary to complete the scope of works, but that were not accounted for in the initial FHWA plan. The analysis indicated a number of efficiencies that could be achieved. The results of this are shown in Exhibit 20. Explanations of specific reductions are detailed in Appendix B3.

Exhibit 19: Scope Reduction from FHWA Initial Financial Plan
(2009$, Million)

Scope Reduction	DBB	DBF	DBFOM
Parking garage	14	14	14
Demolition	23	23	23
Total	37	37	37

Source: Arup/PB

Exhibit 20: Net Cost Adjustments and Efficiencies
(2009$, Million)

Net Adjustment	DBB	DBF	DBFOM
Gap Analysis additional costs			
Design management	0.3	0.3	
Home office management	2.8		
Quality control	0.4		
Presidio Trust – design support	2.1	2.1	2.1
Presidio Trust – construction support	10.0	10.0	10.0
Consultant engineering	14.5	25.9	25.9
Department oversight			3.9
Contractor QAQC		1.6	6.8
Construction reserve		15.7	
Subtotal: additional costs	30.1	55.6	48.7
Design build efficiencies			
Demolition		(1.2)	(1.1)
Design		(5.8)	(5.8)
Construction management			(41.4)
Structures		(5.4)	(10.8)
Tunnels		(7.1)	(14.3)
TRO & mobilization		(1.2)	(1.3)
Subtotal: design build efficiencies		(20.7)	(74.7)
Total net adjustment	30.1	34.9	(26.0)

Source: Arup/PB

3.2.3 Public Sector Costs

In order to model only the construction costs that would be included in a contractor's bid, the costs included in the FHWA plan that would be still be borne by the public sector under a P3 option were removed and were re-included where necessary later in the model.

The functions that would be performed by the Department in the DBB that would be performed by the contractor in the DBF and DBFOM options have not been removed, as this cost would be included in the contract price. Therefore, more costs have been removed from the DBB option than from the DBF or DBFOM options. These costs are shown in Exhibit 21.

Exhibit 21: Public Sector Costs Removed from the FHWA Plan
(2009$, Million)

Public Sector Costs	DBB	DBF	DBFOM
Design management	(0.3)	(0.3)	
Design	(5.8)		
Home office management	(2.8)	(0.6)	
Construction management	(41.4)	(41.4)	
Quality control	(0.4)	(0.4)	
Consultant engineering	(28.5)		
Department-supplied materials	(8.5)	(8.5)	(8.5)
Construction reserve	(17.6)	(34.9)	(17.2)
Department oversight			(3.9)
Total	(105.3)	(86.1)	(29.6)

Source: Arup/PB

3.2.4 Adjusted Base Cost

These adjustments to the FHWA plan result in the adjusted base costs, shown in Exhibit 22. The explanation for the cost adjustments is detailed in Appendix B3.

Exhibit 22: Adjusted Base Costs
(2009$, Million)

Adjusted base costs	DBB	DBF	DBFOM
Total	374.1	398.1	393.8

Source: Arup/PB

3.2.5 Expended Design

A portion of costs included in the FHWA plan have already been incurred. In order to produce a comparison of costs going forward, these costs have been removed. These costs are the same for each option, shown in Exhibit 23, and will continue to be the same until a decision is made to pursue one particular option.

Exhibit 23: Expended Design to August 2009
(2009$, Million)

Sunk costs	DBB	DBF	DBFOM
Total	12.5	12.5	12.5

Source: Arup/PB

3.2.6 Key Drivers for Design-Build Costs for DBF and DBFOM Options

The design-build contractor under either the DBF or DBFOM options is expected to bid on the Project when the design is not yet complete. Therefore, the design-build contractor assumes certain design-related risks that are not applicable in a conventional DBB procurement.

As a consequence, the design-build bids received for the Project are expected to include a risk premium that prices the risks that are allocated to the design-build contractor. While this results in a higher initial bid price, the design-build options yield greater outcome certainty and a lower total cost.

While the design-build contractor is asked to carry additional design risks, a design-build contract also provides the opportunity to create cost and schedule efficiencies (i.e., cost savings). These savings result in a lower bid price. Potential efficiencies include the following:

- Construction means and methods: The design is developed in collaboration with the contractor and tailored to the contractor's specific equipment and areas of expertise, yielding cost savings. Examples include excavation and tunneling techniques, construction staging, types of piles and methods for pile driving, etc.
- Design optimization: A design-build contract (particularly when part of a DBFOM) generally concentrates on output specifications rather than design specifications, leaving somewhat greater latitude for the designer, in collaboration with the contractor (and the operator), to choose among bridge and tunnel types, pavement types, other material choices, road profile optimizing cut and fill, etc. Such design choices aim at lowering not only the upfront capital costs but also the life-cycle costs under a DBFOM.
- Schedule acceleration: Under the DBFOM or DBF options, design and construction activities take place in parallel, thus eliminating the need to wait for a complete design before starting construction. By working collaboratively, the designer and contractor can also respond faster to ambiguity in design, errors and omissions, or unexpected events that occur on site, without having to refer back to the owner for approval.

- Larger contract size: In the case of this Project, the design-build contract would cover the scope that would be delivered under four different contracts in the DBB option. Additional efficiencies can be created by reducing the interface among different contractors working in a constrained site, thus providing continuity for horizontal construction activities (drainage system, pavement, etc.), demolition activities, and mobilization and demobilization. This is explained further in Appendix C2.

3.2.7 DBF and DBFOM Efficiencies

Major project elements were reviewed and assessed for efficiencies of cost and of time that could be generated under the DBF and the DBFOM delivery methods. Under the DBFOM method, cost savings of approximately $26 million could be achieved. This is equivalent to 5 percent of the FHWA Initial Financial Plan baseline cost.

Conversely, in the DBF option the cost efficiencies would be offset by additional soft-cost adjustments. The net upward cost adjustment amount is estimated at approximately +$35 million, an increase of 7 percent over the FHWA Initial Financial Plan baseline cost (see Appendix B1 for the breakdown).

The ability of a designer-builder to generate cost and time efficiencies is constrained in this Project because of the following:

- **Advanced design**: the Project design is nearly 50 percent complete, which is more advanced than would be the case for a traditional DBF or DBFOM. Therefore, the opportunities for tailoring the design to a specific contractor's means and methods are limited.
- **Design continuity**: Design choices made for Contracts 3 and 4 impose criteria on the design elements under Contracts 5 through 7; these limit design optimization and choices in means and methods. For instance, the bridge type for the southbound High Viaduct in Contract 3 imposes the construction of a twin viaduct northbound in Contract 7. Similarly, the choice of continuously reinforced concrete pavement, (which has a 40-year design life) in Contracts 3 and 4 must extend to Contracts 5 through 7. Other elements requiring design continuity include road profile, tunnel portals and lining, safety barriers, and lighting.
- **Site and environmental constraints**: The Refined Alternative defined in the FEIS/R calls for a restricted road geometry (horizontal and vertical alignments and cross sections), as well as design elements tailored to the site that prevent the use of standard details. Otherwise, these details could be used at a lower cost without impacting the longevity of structures. These constraints result in a long list of special design elements, as well as restrictions as to the means and methods (for activities such as tunnel boring).
- **Schedule constraints**: The current schedule presented in the FHWA Initial Financial Plan is already considered an accelerated schedule. This is discussed further in Section 5.2.
- **Contract scope and interface**: Most efficiencies for the Project are generated by the elimination of interfaces in Contracts 5 through 8. A larger scope of work that would encompass Contracts 1 through 8 could further reduce interfaces (particularly between Contracts 3 and 4 and among Contracts 5 through 7) and could therefore increase cost efficiencies. However, this is not considered feasible at this point of development of the Project.

3.2.8 Current Market Conditions

The baseline cost estimates included in the FHWA Initial Financial Plan were based on estimates made before the economy, and in particular the construction market, had entered a full recession. Current construction market conditions are characterized by actual bids that are significantly lower than Engineer's Estimates (EEs) that were produced when market conditions were more expensive. For example, on October 7, 2009, the Department received a low bid for Contract 3 of $48.4 million; 42 percent below the previous EE for the same scope of work.

The construction cost estimates in this report do not include any adjustments to the FHWA Initial Financial Plan to reflect current market conditions.

There is uncertainty as to how long a construction market environment that is very favorable to owners will hold. Most market participants expect that it will hold into 2010 and possibly into 2011. Therefore, we expect that all options considered in this report will likely benefit from significantly lower bids than the EEs produced previously, specifically with respect to the cost estimates included in the FHWA Initial Financial Plan of May 2009.

The relative assessments made in this report of the delivery options focus primarily on the differentials in expected outcomes between the options. The absolute construction cost estimates for the work previously planned under Contracts 5 through 8 should be re-evaluated with a new baseline cost estimate for the Project as a whole. This re-evaluation, when conducted, should take into account the expected market conditions for contracts not yet bid, as well as actual and expected project costs of Contracts 1 through 4 and the right of way costs.

3.3 RESPONSIBILITY AND RISK ALLOCATION

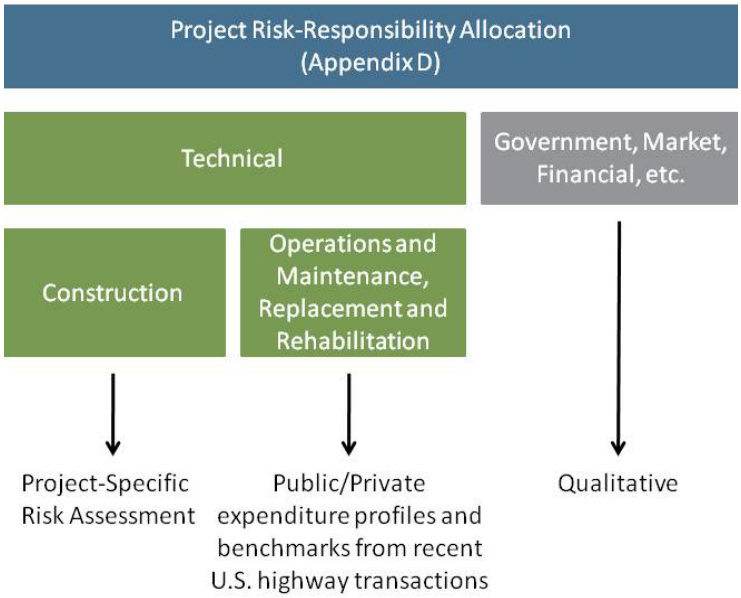
The objective of the responsibility and risk allocation assessment is to determine the expected cost at completion for each of the delivery options based on project-specific knowledge. For this report, the analysis has considered the specific risk profile of the Project.

The expected cost at completion is defined as the risk-adjusted project construction cost at the procurement delivery option decision stage. Based on the responsibility and risk allocation, the risk analysis produced relevant risk adjustments for each option. These values have also been compared with statistical data for historical optimism bias.

The rationale behind the risk allocation was to determine how the Project could transfer the risks to the party in the best position to manage them. For example, the public sector is best able to manage regulatory risk, as it has the ability to modify codes and laws, whereas a contractor in the private sector in better positioned to manage construction risks, such as delays and cost overruns.

The overall risk analysis structure for the analysis of the Presidio Parkway delivery options is shown in Exhibit 24.

Exhibit 24: Overall Risk Analysis Structure



Source: Arup/PB

Based on this structure, an overall project risk-responsibility matrix was prepared to address a spectrum of project risks and is shown in Appendix D. A subset of identified technical risks that relate specifically to construction was considered in greater detail to estimate the construction cost risk allowances. The project-specific risks that impact the Project's construction costs were broken down into ten categories as shown in Exhibit 25.

The O&M and R&R risks were estimated using benchmarks. In the same way that the analysis assumes that the private sector would add a risk contingency to the construction costs, an added contingency has also been assumed for the O&M and capital R&R costs for the risk that the actual costs could exceed budgeted amounts. Similarly, an appropriate optimism bias factor for the O&M and R&R costs for the DBB and DBF options was applied; this additional factor is based on the expected cost overruns through the traditional public sector long-term responsibility of the asset, as discussed in Section 3.4.2. This optimism bias factor for O&M and R&R was calculated from guidance used recently by the Florida Department of Transportation for its VfM assessments.[5]

Non-technical risks, such as market and political risks, were not quantified for their impact on the cash flows but were considered qualitatively elsewhere in this report. This is because they were considered difficult to quantify with a sufficient degree of accuracy for a basis of comparison.

The allocation of the risk responsibility under the three options was classified as Public, Private, or Shared. The risks were either annotated as Public or Private, implying a 100-percent responsibility respectively, or shared with an indicative proportional split shown between the Public and Private sectors.

A more detailed risk responsibility allocation matrix would be required by the Project Sponsors when deciding to proceed with either a DBF or DBFOM procurement option. This would ultimately form the basis of the relevant construction or concession agreements. An indicative risk allocation responsibility matrix is provided in Exhibit 25, with more detail provided in Appendix D.

[5] See for example the "I-595 Corridor Roadway Improvement, Value for Money Analysis" by Jeffery A. Parker & Associates, Inc., June 2009.

Exhibit 25: Indicative Risk-Responsibility Matrix

Category	Indicative Risk Responsibility Allocation		
	DBB	DBF	DBFOM
A. Interface (during construction phase)			
1. Contract Interface			
Contracts 1-4 (schedule, O&M, residual works passed down, warranties, latent defects)	Public	Public	Shared (70/30)
2. Right of Entry			
Site (impeded) access	Public	Public	Public
3. Multi-party Interface			
GGBHTD	Public	Shared (50/50)	Shared (50/50)
Presidio Trust	Public	Shared (50/50)	Shared (50/50)
Other agencies	Public	Shared (50/50)	Shared (50/50)
Permits & approvals	Public	Shared (50/50)	Shared (50/50)
Public engagement	Public	Shared (50/50)	Shared (50/50)
B. Site			
4. Environmental/Historical Artifacts			
Cultural resources (archaeological, unidentified)	Public	Public	Public
Hazardous materials (unidentified)	Public	Public	Public
Natural resources (unidentified)	Public	Public	Public
5. Geotechnical			
Geotechnical (unidentified)	Public	Private	Private
C. Construction			
6. Site Construction			
Labor disputes	Private	Private	Private
Weather	Private	Private	Private
7. Technical			
Design plans and specification	Public	Public*	Private
Technical obsolescence or innovation	Public	Public*	Private
Design continuity with as-built contracts	Public	Public*	Private
D. Unknown unknowns			
8. Contractor Failures			
Construction general contractor failure	Public	Public	Private
9. Cost overrun			
Cost overrun risk during construction (separate from risks identified above)	Shared (85/15)	Shared (85/15)	Private
10. Quality			
Quality during construction	Shared (15/85)	Shared (15/85)	Private
Warranties and defects (Contracts 5-8)	Private	Private	Private

* This is atypical for DBF but occurs because of the high level of design development for Phase II that has already been achieved and because of site-specific design constraints from matching existing designs for compatibility with Phase I.

Note: Shared (15/85) reflects a risk responsibility of 85% Public and 15% Private.

Source: Arup/PB

Exhibit 26: Delivery Options Risk Transfer

	DBB	DBF	DBFOM
Construction time overruns	●	■	■
Construction cost overruns	●	♦	■
Maintenance	●	●	■
Operations	●	●	■

Key: ■ = optimal risk transfer
♦ = moderate risk transfer
● = sub-optimal risk transfer

Source: Arup/PB

3.3.1 Risk Allocation and Risk Transfer

The optimal risk allocation is achieved by transferring key risks to the party best able to manage them. Effective risk transfer through commercial project agreements impacts the final price which the bidding party is willing to accept. A summary of each option's ability to manage key tasks is illustrated in Exhibit 26.

DBB Expected Risk Allocation

Under the DBB option, the Project would be procured as one design contract and four discrete construction contracts; each of these is defined in the FHWA Initial Financing Plan.

The Department's oversight and acceptance of design before putting the construction contracts out to bid means that the Department is responsible for the performance of the completed design against its original specification.

With DBB, the requirement for design and construction oversight means that there are increased resource requirements during design and construction, as compared with the DBFOM option. During construction, this oversight extends to quality assurance/quality control, controls for the review and certification of payments made to the contractors, review of potential change orders, changes to the design that may be required by site conditions, and other similar issues that normally arise during construction. Conversely, as the work is inspected and accepted by the Department during the course of construction, the Department assumes effective responsibility for the outturn quality of the work.

The risk of contractor non-performance is generally retained by the public sector, except to the extent that this risk is mitigated by the standard protection against such an event through surety bonds that are required from the construction contractors.

The use of a number of smaller contracts helps the Department to manage the risk of non-performance by a single contractor by limiting the exposure on each contract. The Department can also attract a larger number of smaller contractors to bid on the multiple contracts.

The interfaces among the multiple contractors working in parallel on the site would be managed by the Department. This would result in the Department retaining the risks associated with these interfaces.[6] The above characteristics of this procurement option account for the magnitude of cost and schedule over-run risks that are retained by the public sector under the DBB option.

[6] For the DBB option, the Project Sponsors may consider combining the scope of work of Contracts 5 through 8 under a single larger contract. However, this variation of the DBB option has not been considered in this analysis because it is not the approach that has been established by the Project Sponsors, nor is it likely to be feasible to change the approach.

DBF Expected Risk Allocation

The primary differences between the DBF and DBB options are that the following assessed risks and responsibilities are transferred on to the DBF contractor:

- Completion of the design
- Interfaces among the construction sub-contractors on site

The DBF contractor has a stronger incentive to complete the construction on schedule than in the DBB option, as a result of the payments being deferred to the end of construction.

The DBF contractor has no long-term asset performance responsibility and, as a consequence, the public sector retains the same oversight responsibility over design and construction as in the DBB option. This results in the public sector retaining many of the Project's performance risks.

Fundamentally, the public sector is buying an asset from the DBF contractor in this option.

DBFOM Expected Risk Allocation

As shown in Exhibit 26, the DBFOM would offer the most appropriate transfer of risks to the private sector by transferring key risks related to construction to the party best able to manage them: a private company or concessionaire that has a business model dedicated to these services. The concessionaire would be responsible for both project delivery and for long-term performance that is subject to the Project Sponsors' output specifications (such as maintenance performance standards). The DBFOM commercial structure, turn-key contracts, and financial security packages also work to ensure that the incentives of the private sector parties are aligned with those of the Project Sponsors.

Under the DBFOM and DBF models, construction contractors are empowered to make any and all decisions necessary to meet project performance goals. In the DBF and DBB options, Caltrans will retain significant project risks that are traditionally best managed by the private sector contractor through the Project Sponsors' oversight role during design and construction. Caltrans will retain most of the long-term performance risk in a DBF or DBB because of their maintenance and operation responsibilities over the full life of the asset.

Furthermore, the key factors discussed above impose greater discipline on the private sector to manage the risks it carries:

- The DBFOM concessionaire is responsible for the long-term performance of the asset because the concessionaire has an obligation to operate and maintain the Project for the duration of the concession after construction is completed; this is assumed to be 30 years, after which time the asset is handed back to the public sector.
- The private financing structure of long-term equity investments and loans imposes consequences on the concessionaires' sub-contractors through enforceable contractual features such as liquidated damages, warranties, letters of credit, performance bonds, and/or parent company guarantees.

To achieve an effective allocation of risks and to impose the discipline required by the above factors, the public sector role would be limited to measuring and enforcing performance of the asset. In this option, the public sector is essentially buying services from the DBFOM concessionaire over the useful life of the Project.

The construction contractor subcontracted to the DBFOM concessionaire assumes most of the delivery risks and responsibilities, with the exception of a small subset of enumerated items that are retained by the public sector. Thus the concessionaire would be responsible for such issues as the interfaces with third parties, the risk of unknown site conditions (e.g., unknown archeological finds), and the interface risk of the DBFOM scope of work previously completed by the Department under conventional procurement.

The DBFOM subcontracts between the concessionaire and the subcontractors offer very limited opportunities for the latter to claim additional time or compensation. Such claims are generally restricted to unusual events that are

outside of the concessionaire's control, according to the risk responsibility allocation matrix in Exhibit 25 above, such as the land not being made available, archeological discoveries, unknown hazardous materials (HAZMAT), or political unrest.

From a public sector perspective, the above factors result in a significantly greater certainty of cost and schedule outcome with the DBFOM option as compared with the DBB option and, to a somewhat lesser extent, as compared with the DBF option as well.

3.4 RISK-ADJUSTED EXPECTED CONSTRUCTION COSTS

The Project construction cost estimates are based upon risk transfer and efficiencies assumptions that are different under a traditional DBB versus a DBF or DBFOM agreement.

In general, under a DBB the public sector retains significant risks in design and construction:

- Differing site conditions
- Changes in the character of the work
- Scope changes
- Third-party interface
- Errors and omissions in design

Under a DBB option, the contractor's bid is based on a complete set of design specifications, engineering drawings, and site information provided by the Project Sponsor. The Project Sponsor is ultimately responsible for any variance from the information provided at the time of bid, and any such variance provides the contractor with the basis to claim additional time and compensation.

In addition to these risks, large-scale infrastructure projects are subject to additional interface risks and scope changes that occur throughout the development and implementation phases of a project. For example, timely decision making of key stakeholders or changes to the public sector requirements such as an additional ramp. The retention of these risks by the Project Sponsor often leads to total project costs at completion that are, on average, higher than the original EEs developed at the time of the bid and beyond the amounts set aside for contingencies.

3.4.1 Construction Cost Risk Assessment

The construction risk register shown in Exhibit 25 lists four risk groupings—interface, site, construction, and "unknown unknowns"—with a total of ten risk categories across these groupings. The risks were rated for their probability of occurrence and for their expected cost in the event of occurrence for each of the delivery options, DBB, DBF, and DBFOM.

The construction risk register was used as an input to a Monte Carlo simulation of the risks. Following this analysis, the risk exposure values corresponding to the 80 percent confidence level were estimated as described in Exhibit 27.

To correctly model the costs that are financed by the private sector in the DBFOM and DBF options (versus the costs that are paid directly by the public sector and therefore are not financed), these risk values were further allocated between private and public sectors for each option. This breakdown is illustrated in Appendix B4.

Exhibit 27: Risk Exposure Values for the DBB, DBF, and DBFOM Options
(2009$, Million and % baseline cost)

	DBB	DBF	DBFOM
Value of estimated risk exposure	108	84	54
% of baseline construction cost specific to each option	+29%	+21%	+14%

Source: Arup/PB

3.4.2 The Department and Benchmark Risk Adjustments

There is evidence of cost overruns in traditional public works procurement, although there are a limited number of comprehensive statistical analyses available. These cost overruns are commonly referred to in the industry as "optimism bias." Below is a summary of the available literature regarding such cost overruns.

A statistical analysis of 167 large-scale international and U.S. DBB road projects indicates that costs for highway projects are on average 20 percent higher than the cost estimate at the time the decision to invest is made (with a standard deviation of 30 percent).[7] Using a similar sample, the uplift necessary to eliminate the risk of cost overrun at the 80th percentile level of confidence is 32 percent.[8.] A smaller sample from the same database of 24 DBB highway projects in North America indicates an average cost overrun of 8 percent, although with a 49 percent standard deviation.

The U.S. General Accounting Office has published a study of 26 large-scale U.S. highway projects with a construction value over $100 million, constructed from 1988 to 1993, which showed an average cost overrun of approximately 41 percent (with a standard deviation of approximately 45 percent).[9] At the 80th percentile confidence level the cost overrun was reported at 55 percent.

In support of the analysis of construction cost overrun risk for this Project, the Department provided the Consultant Team with a database of 152 highway construction contracts in California, which all had construction values above $25 million and were procured under DBB between 1981 and 2006. The data compared the original EE at the time of bid (plus initial contingencies and estimates for supplemental work) with the final out-turn construction cost. The data did not include design and construction management costs that may also have experienced cost overruns.

While the entire Department data sample indicated that the projects were, on average, on-budget, the more relevant sample of 26 contracts with values above $100 million (in 2009$) were delivered on average 25 percent over the initial EE (with a standard deviation of 60 percent).[10] At the 80th percentile, the cost overrun of this sample was 39 percent. A smaller sample of all five projects above $300 million (in 2009$) showed significantly higher cost overruns; however, since the sample is small the significance of statistical analysis is limited.

A noticeable trend that is relevant for this Project in the above-referenced Department historical data is that as the project size increases, so do the average amount and the standard deviation of the cost overrun. This confirms the intuition that, all else being equal, larger and more complex projects tend to have proportionally larger cost overruns.

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[7] Bent Flyvbjerg, Mette Skamris Holm, and Søren Buhl, "Underestimating Costs in Public Works Projects: Error or Lie?" Journal of the American Planning Association, Vol. 68, No. 3, Summer 2002. American Planning Association, Chicago, IL.

[8] Bent Flyvberg in association with COWI, "Procedures for Dealing with Optimism Bias in Transportation Planning," Guidance Document, The British Department for Transport, June 2004.

[9] Arup/PB JV calculation based on United States General Accountability Office, "Managing the Costs of Large-Dollar Highway Projects," Report to the Chairman, Subcommittee on Government Management, Restructuring, and the District of Columbia, Committee on Governmental Affairs, U.S. Senate, February 1997.

[10] Caltrans database and Arup/PB Joint Venture calculation: Annual cost escalation to establish costs in 2009$ is assumed to be 3%. Cost overrun is measured as Final Estimate Amount / (Engineer Estimate Amount + Contingency Amount + Supplemental Work Amount).

Exhibit 28: Construction Cost Risk Adjustment

	DBB	DBF	DBFOM
Arup/PB Project-specific analysis	29%	21%	14%
Bent Flyvbjerg Database[7,8]	32%	N/A	N/A
Department contracts above $100 Million[10]	39%	N/A	N/A
U.S. Government Accountability Office[9]	55%	N/A	N/A
UK HM Treasury Value for Money Guidelines[11]	66%	N/A	N/A
Florida DOT I-595 Value for Money Report[12]	20%	10%	5%

Source: National and International Benchmarks

As can be seen in Exhibit 28, the assumed DBB construction risk adjustment (+29 percent) is reasonable with respect to figures used in relevant recent transactions. Example include: a factor of +20 percent used by Florida Department of Transportation (DOT) in the VfM analysis of the I-595 Project referenced above; international industry guidelines (e.g., Bent Flyvbjerg database with a factor of +32 percent); and the results of what would be traditionally expected from the Department's historical data (with a factor of +39 percent). Refer to Appendix E for a further explanation.

The DBFOM option's construction risk adjustment (+14 percent) highlights the impact of the site-specific risks that have been taken into account. These include the interface risks with Contracts 1 through 4 (works that are being procured conventionally) and risks associated with sites, like the Presidio, that have multiple stakeholders. This risk adjustment indicates that a conservative approach has been taken when compared with the same recent transaction quoted above (the Florida DOT VfM analysis of the I-595 Project, which had a factor of +5 percent for the DBFOM option). This same rationale was applied for the DBF option analysis.

Exhibit 29 shows the O&M optimism bias from industry guidelines and recent transactions.

Exhibit 29: Operations and Maintenance Optimism Bias

	DBB	DBF	DBFOM
Florida DOT I-595 VfM Report[12]	20%	20%	5%
UK HM Treasury[13]	20%	N/A	20%

Source: National and International Benchmarks

3.4.3 Transaction Costs

DBB Option

Transaction costs were estimated from the figures presented in the Project's FHWA–approved financing plan dated May 2009. Public sector transaction costs totaling $90 million have been included in the financial model (2009$), which breaks down as follows:

- Pre-development for the phase including development of the delivery option analysis: $2 million
- Design, design management, construction management, QAQC, and Department-supplied materials: $88 million
- In the DBB option, the construction contractors who bid on the Project include all of their bid costs in their bid prices; therefore, these costs are included in the construction costs

[11] "Review of large Public Procurement in the UK," Optimism bias guidelines by Mott MacDonald for UK HM Treasury. July 2002, page S-2 table 2.
[12] Jeffrey A. Parker & Associates, "I-595 Corridor Roadway Improvement Project: Value for Money Analysis," for the Florida Department of Transportation, June 2009, pages 23 and 25.
[13] HM Treasury, Quantitative Assessment User Guide, March 2007

DBF Option

Transaction costs were estimated from benchmarks of other similar "gap financing" transactions in Florida. The following summarizes the $57 million public sector transaction costs assumed in the financial model (2009$):

- Pre-development, Request for Qualification (RFQ), and Request for Proposal (RFP) phase: $4 million [14]
- Preferred proponent phase: $1 million
- Financial close phase: $1 million
- Construction management, QAQC, and Department-supplied materials: $51 million

The private sector transaction costs assumed in the financial model (2009$) total $4 million and were estimated for the DBF contractor's bid and development costs up to Financial Close. The DBF contractor's management costs during construction are included in the construction costs.

DBFOM Option

Transaction costs were estimated from benchmarks of other similar transactions in North America over the last four years. The following summarizes the $30 million public sector transaction costs assumed in the financial model (2009$):

- Pre-development, RFQ, and RFP phase: $8 million[15]
- Preferred proponent phase: $2 million[16]
- Financial close phase: $5 million
- Stipends for losing bidders (if any): $3 million[17]
- Construction oversight and Department-supplied materials: $12 million

The following summarizes the $16 million private sector transaction costs assumed in the financial model (2009$):

- Bid and development costs up to Financial Close: $10 million
- Concessionaire oversight costs during construction: $6 million

3.5 CONSTRUCTION COST INPUTS

Exhibit 30, Exhibit 31, and Exhibit 32 show how the construction costs in the financial model reflect cost adjustments and risk assessments. Starting with the cost estimate from the FHWA Initial Financial Plan, cost adjustments are made to reflect the results of the gap analysis and to represent the efficiencies that could be leveraged by a private concessionaire. Note that the public sector costs included in the FHWA Initial Financial Plan were removed to show an "adjusted base cost to contractor" that represents the cost to the contractor (in the DBB or the DBF) or to the SPV (in the DBFOM). This results in the "adjusted base cost."

Added to the adjusted base cost is the appropriate portion of the calculated risk adjustment retained by the contractor in each option, plus the private sector's transaction costs, to reach the "Contractor's Bid Price." In the DBF or DBFOM options, this is the cost which is financed by the DBF contractor or DBFOM concessionaire, respectively.

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[14] Includes Project Sponsor's own staff and consultant costs for development of the P3 analysis and documentation, including the RFQ and RFP.

[15] Includes Project Sponsor's own staff and consultant costs for development of the P3 analysis and documentation, including the RFQ and RFP.

[16] Depending on how the process is structured, this could alternatively be a "Best and Final Offer" phase.

[17] Based on feedback from market participants during the Industry Forum held on July 6 and 7, 2009, an allowance for stipends is included;.however, stipends may not be required.

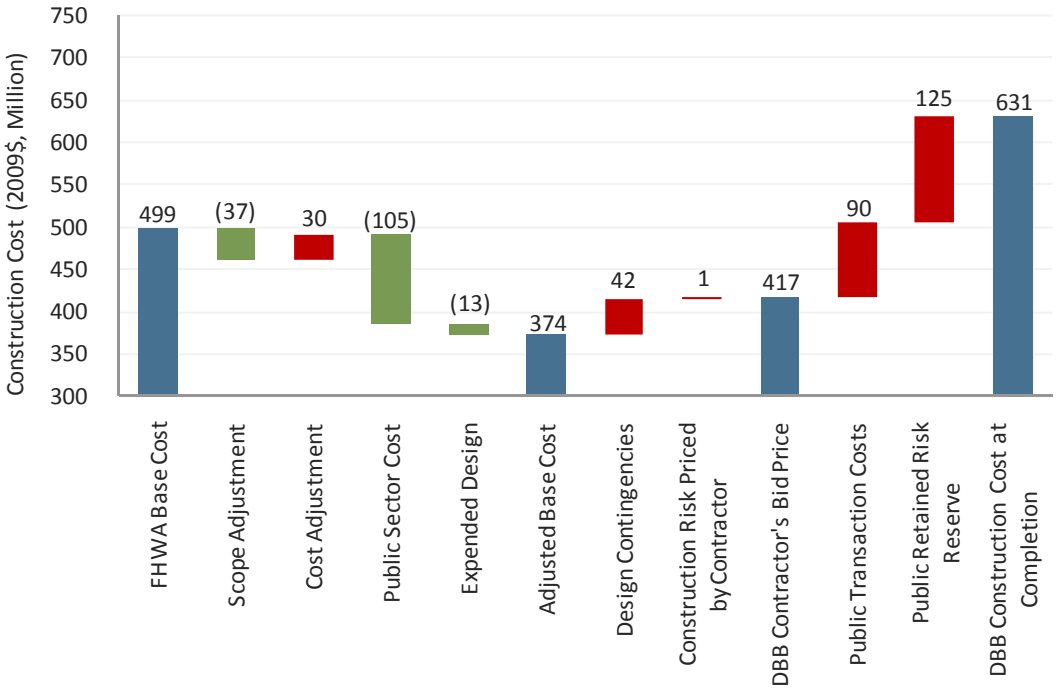
Added to the Contractor's Bid Price is the appropriate portion of the calculated risk adjustment retained by the public sector. The public costs that were removed in the earlier step are added back in, as are transaction costs that were not included in the FHWA Initial Financial Plan as appropriate. The sum of these costs is the total "construction cost at completion," which is the total cost during construction considered in the VfM analysis.

The split of risk responsibility between public and private can be seen in the exhibits below. In the DBB case, the contractor prices less risk into the contract, and the public retains the majority of the risk and would pay for overruns.

In the DBFOM case, the contractor prices more risk into the contract bid, as a "risk premium," because the contractor is responsible for a greater number of risks and therefore for potential cost overruns. The total cost of the risks in the DBFOM, however, is lower than in the DBB. Explanatory notes on the costs breakdown for both the DBB and DBFOM cases are shown in Appendix B.

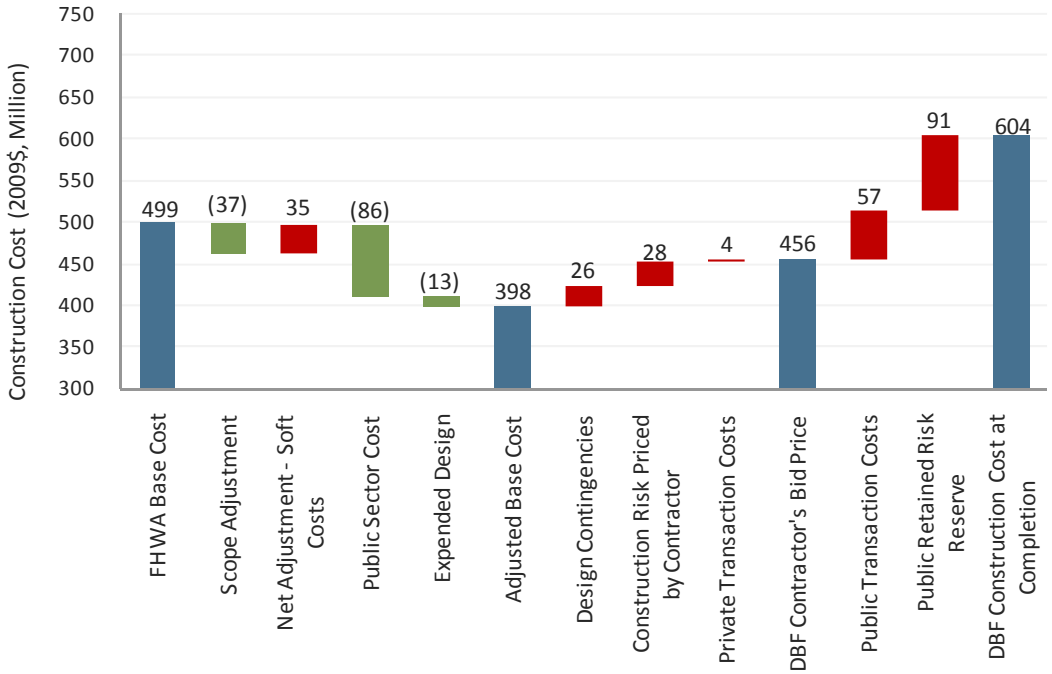
In terms of risk allocation and cost, the DBF is more similar to the DBB than the DBFOM.

Exhibit 30: DBB Costs during Construction



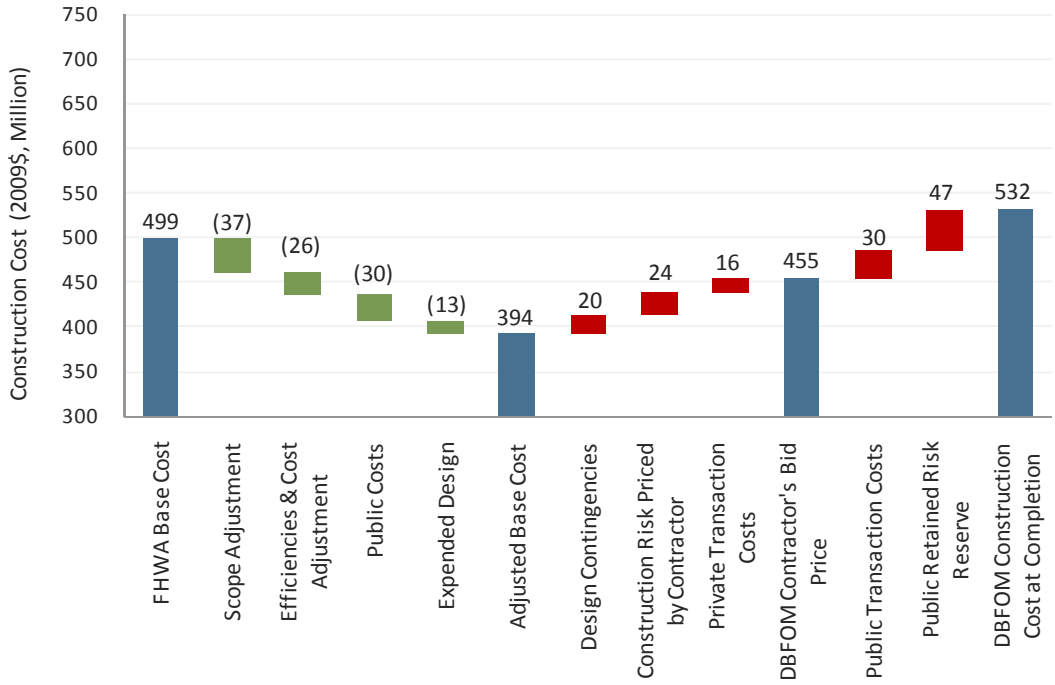
Source: Arup/PB

Exhibit 31: DBF Option Total Costs during Construction



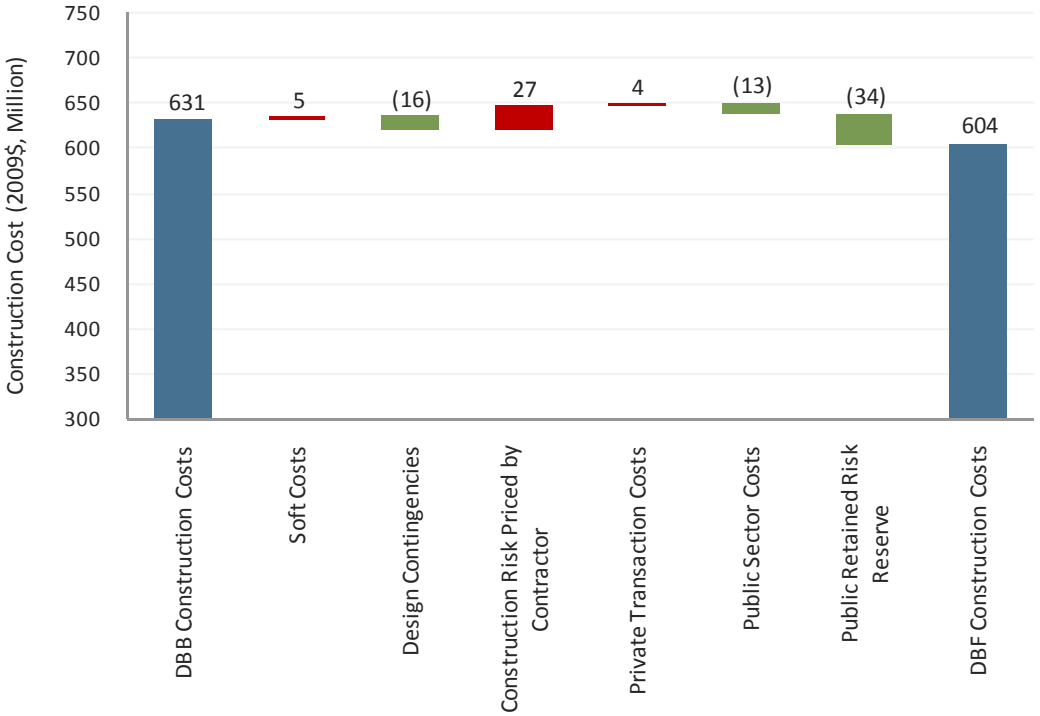
Source: Arup/PB

Exhibit 32: DBFOM Costs during Construction



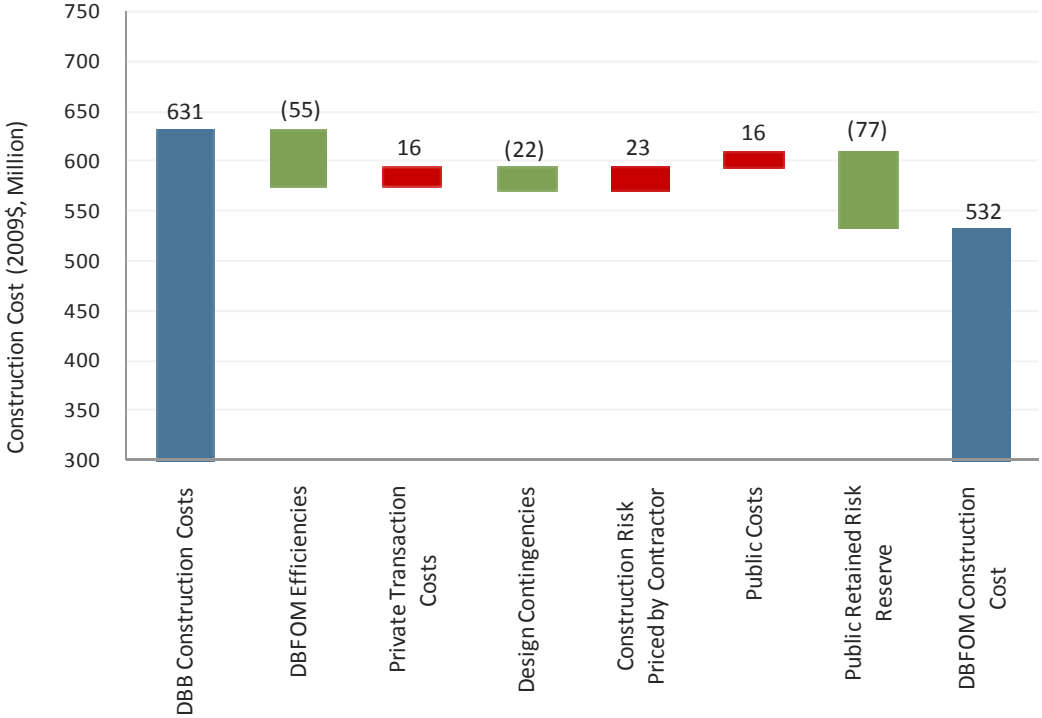
Source: Arup/PB

Exhibit 33: Comparison of Total Costs during Construction for DBB and DBF Options



Source: Arup/PB

Exhibit 34: Comparison of Costs during Construction for DBB and DBFOM Options



Source: Arup/PB

3.5.1 Cost Comparison

Exhibit 33 and Exhibit 34 provide an explanation of how total costs during construction compare for the DBB option versus the DBF and DBFOM options, respectively.

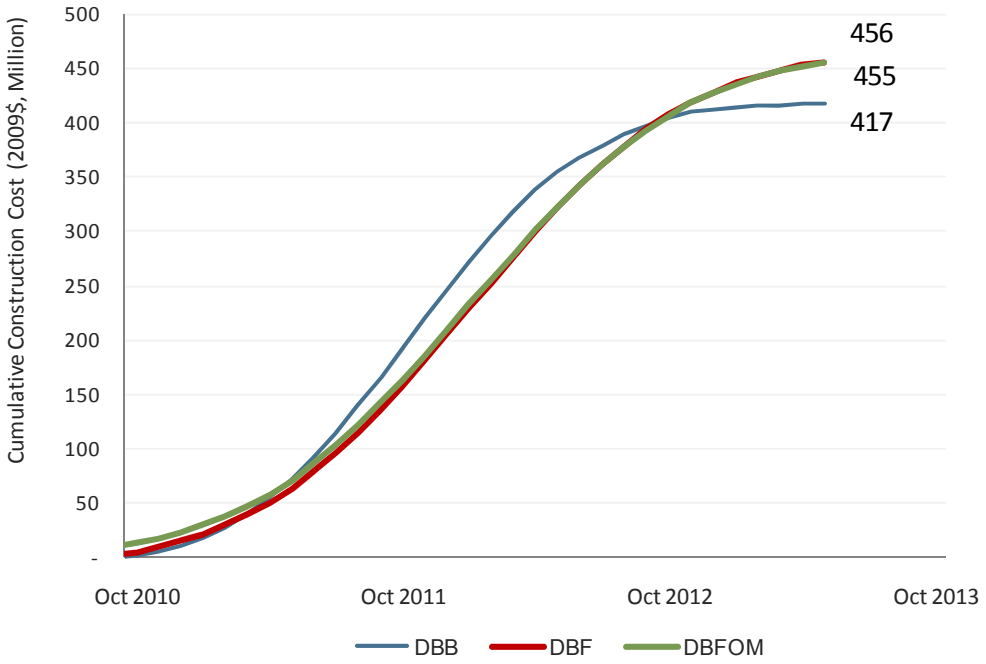
3.5.2 Construction Cost Cash Flow

Construction cost cash flows for the Project under DBB are based on the start and finish dates indicated in the FHWA Initial Financial Plan, dated May 2009, for Contracts 5 through 8, and assume that capital outlays will follow an industry-standard S-curve that is based on a normal distribution (see Exhibit 35). The S-curves for each individual contract are then aggregated to form the overall project cash flow.

For the DBF and DBFOM options, Contracts 5 through 8 are combined to form one contract and the same standard S-curve is applied to the aggregated contract that was applied to each of the individual contracts in the DBB option. For the purposes of this analysis, the start and finish dates were assumed to be the same as those for the DBB option—they mirror those in the FHWA Initial Financial Plan of May 2009. These start and finish dates should be re-evaluated when an updated overall project construction schedule becomes available.

In the base case, project cash flows are escalated at a rate of 3 percent per annum, compounded semi-annually. This is the construction cost escalation rate assumed in the FHWA Initial Financial Plan of May 2009.

Exhibit 35: Construction Period Projections[18]



Source: Arup/PB

[18] The S-curve construction costs shown in this graph only include the costs that are financed by the concessionaire / contractor. It does not include public sector oversight costs or retained risk reserves. In other words, the cumulative total of the S-curve at the end of construction matches the "Contractor's Bid Price" item in Exhibits 30, 31 and 32 above.

3.6 OPERATIONS AND MAINTENANCE

O&M cost estimates were developed by using an activity-based cost model, with activities disaggregated at the functional level to arrive at specific staffing requirements based on productivity assumptions. The same modeling approach has been used by members of the Consultant Team for private bidders in recent North America transactions.

This model is tailored to the specifics of the Project and adjusted for the DBB, DBF, and DBFOM options. The O&M costs for the DBB and DBF options are assumed to be the same, and the Department would be responsible for the O&M of the Project under its normal procedures and budgeting process.

3.6.1 Operations

The Department's traffic operations responsibilities and standards are described in the Traffic Operations Management Information System (TOMIS) and are grouped into the following categories.[19]

1. Traffic safety
2. System management
3. Toll operations (n/a)
4. Outdoor advertising
5. Encroachment permits
6. Transportation permits
7. Other programs

The Department and the Consultant Team conducted workshops to review the operating responsibilities detailed in the TOMIS and to assess which responsibilities could be transferred most cost efficiently to the concessionaire under a DBFOM and which responsibilities would be retained by the Department.

Under a private operation scenario, the general concept would be for the Department to retain all TOMIS responsibilities for items 1 through 7, except for Freeway Service Patrol, on-site Traffic Management team activities, and other field activities covered under Incident Management (included in item 2, System Management). Tunnel monitoring would be done by the Department through the existing Supervisory Control and Data Acquisition system at the Department's facilities that monitors the Caldecott tunnel (and eventually will monitor the Devil's Slide tunnel). The Department would retain all other operating responsibilities and, in particular, all responsibilities associated with monitoring, evaluating, dispatching, and investigating.

This allocation of responsibilities takes into account the fact that the Department has a well-developed operations system. Given its existing operations and the lack of a private sector market for these types of services in California, the Department is best able to provide monitoring of and oversight for traffic operations for the Presidio Parkway, and can do so at a lower marginal cost.

The primary operating cost assumptions and results under public and private sector operations are summarized in Exhibit 36**.**

[19] State of California, Department of Transportation, Division of Traffic Operations, "Traffic Operations Management Information System (TOMIS) – Work Activities Charging Instructions," 2008.

Exhibit 36: Primary Operating Cost Assumptions
(2009$)

Element	Public Sector Operation (DBB and DBF)	Private Sector Operation (DBFOM)
Executive staff & administrative costs	Overhead multiple of 1.8x assumed on maintenance staffing costs to account for Department executive and administrative costs Executive and administrative staffing included in total annual overhead costs of approximately $377,000 per year beginning in 2013	Executive staff assumed to be part-time and split resources amongst multiple facilities Annual operational staffing cost of approximately $334,000 per year for 1.25 full time equivalent employees beginning in 2013
Salaries & benefits	Staffing costs provided by the Department	Based on local prevailing wages
Other direct costs (ODC)	Costs associated with contracted and outsourced activities such as policing, insurance, freeway service patrol, and utilities, are assumed to be the same in both cases and are excluded from the analysis Other ODCs such as office equipment, consulting & legal fees, and recruiting, are accounted for in an overhead multiplier No cost for ITS operations associated with the Traffic Management Center	Costs associated with contracted and outsourced activities such as policing, insurance, freeway service patrol, and utilities, are assume to be the same in both cases and are excluded from the analysis Annual budget line items for all other ODCs that would be incurred by DBFOM concessionaire Traffic Management Center responsibilities for ITS operations are assumed to be outside of concession scope and are undertaken by the Department because of economies of scale
Total operating costs	Total annual budget of approximately $377,000 starting in 2013	Total annual budget of approximately $833,000 starting in 2013, plus some initial startup costs Higher operating budget relative to public sector case because of economies of scale that are lost with a small-scale, stand-alone operation

Source: Arup/PB

3.6.2 Responsibilities

DBFOM Option

A key feature of the DBFOM concession structure is that it establishes operations and long-term maintenance standards upfront and commits a portion of the annual availability payment to the future funding of O&M, including renewal and major maintenance during the concessionaire term. This is described further in the next section. In addition, the DBFOM concession dedicates a fully staffed O&M organization to the Project to ensure that the expected asset management systems are implemented.

In the DBFOM structure, the DBFOM concessionaire, or an O&M subcontractor to the concessionaire, establishes long-term budgets based on the expected whole-life optimization of the Project. These budgets are updated annually to reflect actual conditions, whether they are better or worse than expected, and are assessed on a projected whole-life basis. From a public sector perspective, the performance requirements of the concession agreement ensure that these budgets are adequate to achieve the contractually established standards.

The industry standard Design-Build sub-contracts used in DBFOM concessions include robust provisions for enforceable warranties against defects and latent defects, backed by liquid security in the form of letters of credit and/or bonds as well as parent company guarantees.

Standard coordination sub-contracts are used to ensure that the DB and O&M sub-contractors coordinate the design features and that the latter inspects the work performed by the former.

These features of a DBFOM concession ensure an adequate level of service (LoS) in the future, equaling or exceeding current highway maintenance standards. The risk of performance during the operations phase is therefore passed down to the DBFOM concessionaire. The concessionaire is given strong incentive to perform the O&M to the required standards. The Department would be in the position to oversee the performance and to assess payment deductions for contract breaches for any documented performance below the standards.

DBB AND DBF OPTIONS

In the cases where the O&M is conducted by the public sector, historical issues that have led to increased risks and life-cycle costs include the following:

- Fiscal constraints on the funding of operations, routine maintenance, and major maintenance interventions in the aggregate for all state facilities
- Funding for the Project in any given year is subject to annual budget allocations, as opposed to long-term budgeting based on project-specific, long-term life-cycle assessment
- A comprehensive asset management approach is not fully implemented at the project level, which would ensure that a project-specific, long-term life-cycle assessment is made each year

The risk for the Project is that insufficient funding for asset management and preventative maintenance would be allocated in some or all years, therefore the Level of Service would be reduced and life-cycle costs would increase above the optimized level. These risks are discussed in more detail in the next section.

To account for these risk factors, VfM analyses of project procurement options typically apply optimism bias to O&M costs, in a similar manner as they are applied to construction costs. The optimism bias values assumed for the three options were taken from the Florida DOT VfM analysis for the I-595. For the DBB and DBF options an optimism bias factor of 20 percent was assumed, whereas for the DBFOM option a 5 percent optimism bias factor was applied.

3.6.3 Routine Maintenance, Rehabilitation, and Handback Conditions

DBFOM COST ESTIMATES

In a DBFOM scenario, the private operator would be responsible for all activities related to routine maintenance and upkeep of “Field Elements” as defined in the TOMIS (see Section 3.6.1), except for maintenance of the off-site tunnel monitoring facility and equipment. The DBFOM concessionaire would also be responsible for all major maintenance or rehabilitation activities throughout the 33 year concession term.

Any maintenance done on the roadway, roadside, and other facilities by a private operator would be performed in accordance with the applicable laws, regulations, and standards. All maintenance activities would incorporate Best Management Practices needed to satisfy the National Pollutant Discharge Elimination System and other environmental and regulatory requirements. It will be the responsibility of the private operator to obtain signed governmental agreements, maintenance agreements, common use agreements, easement agreements, and other necessary agreements.

The cost modeling for maintenance activities uses a bottom-up approach, with activities disaggregated at the functional activity level, to arrive at specific staffing requirements based on productivity assumptions. This detailed look at individual maintenance responsibilities allows for an optimization of general maintenance staffing requirements across several activities by combining similar activities and those with cyclical or seasonal characteristics. After combining the individual full-time equivalent (FTE) requirements by functional maintenance

activity, the sum is rounded up to the nearest whole FTE to provide additional general maintenance support. Equipment and material costs are then sized based on the FTE requirements and asset quantities on the facility.

This cost modeling approach assumes a full self-perform scenario in which the private operator hires adequate staff to perform all routine maintenance tasks in-house without outsourcing any of these tasks to subcontractors. Once these costs have been determined, outsourcing/subcontractor costs are then analyzed and compared against the in-house self-perform costs to determine the most cost-effective approach to undertaking these routine maintenance activities.

Based on the small size of the facility, the analysis demonstrated that the most cost-effective approach to maintaining the facility would be to have a few in-house staff to handle preventative maintenance activities and urgent day-to-day tasks, and to outsource cyclical, scheduled tasks to local contractors who are already established in the San Francisco area. As such, routine tasks—such as sweeping, drainage cleaning, sign cleaning and repair, and guardrail and barrier repair—are assumed to be outsourced through subcontract agreements with the private operator. Given the low number of miles of the facility, economies of scale can be achieved by subcontracting these services to firms that already have a local presence, as opposed to a private operator incurring all the necessary start-up and fixed costs required to perform these functions. This approach of supplementing in-house staff with contractor support minimizes costs while meeting performance standards. It is likely the private sector would adopt the approval of outsourcing functions for this facility.

Handback conditions assumed in the DBFOM option are consistent with the Department receiving an asset in a state of good repair at the end of the concession term, with no major maintenance activities expected within the following ten years. Given the long design-lives of the structures, the handback conditions are primarily focused on pavement standards, as follows:

- Is free of any defects
- Has a minimum 10 year life remaining
- Has striping and delineation that achieves a 95-percent reflectivity standard

DBB AND DBF COST ESTIMATES

Given that the Department's maintenance budget is fiscally constrained, and based on guidance from the Department, it was assumed that under a public sector provision of maintenance services, annual maintenance expenditures would be capped at $468,000 per year in 2009 dollars. Commensurate with the type of infrastructure and the regional significance of the facility, this corresponds to twice the state's per-lane mile average.[20] The rationale for a higher-than-average expenditure rate is that the Project contains several facilities that require more maintenance than a typical highway does (such as tunnels and bridges).

This report assumes that the public sector routine maintenance expenditure will be prioritized toward the fire and life-safety features of the Project—such as tunnel fire detection and fighting systems, tunnel ventilation systems, and roadside safety and monitoring equipment. As such, the level of expenditures for fire and life-safety features is the same under both the private and public sector cases so the private and public procurement options are considered equivalent.

As a result of this necessary prioritization under the public sector case, the routine maintenance funds available for other features of the Project are relatively smaller. These other features include pavements, tunnels, bridges, retaining wall structures, drainage facilities, fencing, lighting, and other smaller items. Therefore, the relative level

[20] The State per lane mile average expenditure is calculated by dividing $1,230 million by 50,000 lane miles under Caltrans responsibility, multiplied by 6 lanes for 1.5 miles and 1 lane for 0.5 mile, yielding $ 234,000 per year (2008/09 dollars). Source: Caltrans, 2009 Five-Year Maintenance Plan, January 2009.

of routine maintenance expenditures on these features is correspondingly less—by a significant margin—in the public sector case as compared with the private sector case.

Consistent with industry knowledge and practice, the Department acknowledges that maintenance activities cannot be deferred in perpetuity and that deferred spending on maintenance will result in increased spending in major maintenance (rehabilitation) in the future. Currently, the Department conducts annual surveys of pavements in California and prioritizes its major maintenance expenditures out of its budget accordingly.

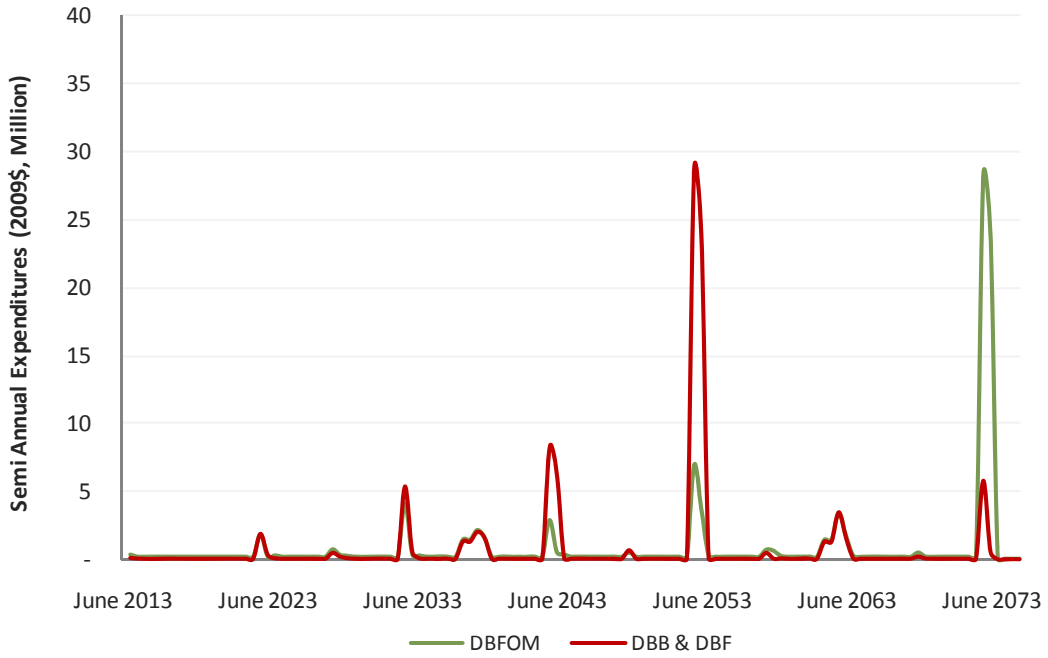
Comparison of DBFOM and DBB/DBF Maintenance Cost Estimates

The trade-off between routine and major maintenance expenditures under public and private sector operations is reflected the cash flow profiles under public and private sector operations. The analysis of O&M costs conducted for this report extends for 60 years (which is well beyond the concession term) in order to capture the whole life expenditure profile of the facilities. The emphasis of the analysis has been on the pavements, and therefore it is considered conservative because the trade-offs for other items such as structures are not taken into account.

According to the Department's 2007 State of the Pavement Report, the trade-off of spending $1 in preventive maintenance today is avoidance of $6 in rehabilitation maintenance per dollar as early as five to seven years later and $20 (YOE$) of reconstruction work as early as 10 years later. According to John Harvey of the University of California's Pavement Research Center in Davis, California, the life-cycle cost of pavement maintenance can be reduced by approximately 20 percent by conducting preventive maintenance.[21]

The constraints on the public O&M budget would lead to reduced LoS between actual rehabilitation interventions as compared with the private sector O&M. The private sector O&M would be fully funded and would create a dedicated O&M organization to carry out routine and preventive maintenance on an annual basis for the Project. See Exhibit 37 for maintenance and rehabilitation cost assumptions under the different delivery options.

Exhibit 37: Routine Maintenance and Rehabilitation



Source: PB

[21] Interview in the Sacramento Bee newspaper, "Research and rehab in gear for California's rough highways," August 18, 2009.

This difference in LoS is not accounted for in the quantitative analysis of costs because economic and social costs have not been assigned to the reduction in LoS that would be expected for the DBB or DBF options, as compared with the DBFOM option. The analysis presented herein only takes account of the monetary trade-off in preventing major maintenance (rehabilitation) and replacement expenditures from occurring earlier than planned.

The resulting routine maintenance and rehabilitation cash flows for the DBB/DBF and the DBFOM options are presented in Appendix F3; in particular, the acceleration of pavement-related rehabilitation costs is shown for the DBB/DBF options.

The NPV cost, at 8.5%, of these cash flows shows a total of $23 million in the DBB and DBF options, against $18 million in the DBFOM, to provide the above levels of service.

3.7 FINANCE AND TAX

3.7.1 Financial Market Conditions

We have made a number of assumptions about the general availability and cost of financing in the market. These assumptions may or may not prove to be accurate at the time of the bid. The lack of liquidity in the financial markets, the continued negative perception of the credit of the State of California, a change in the nature and type of federal transportation funding, or an increase in the cost of debt or required equity returns could each significantly change the outcome of the VfM analysis at the time of final bids.

The capital markets have been experiencing a global lack of liquidity and credit, and the P3 credit market has been no different and has experienced stress. For example, two transactions with demand risk in their revenue streams were cancelled late in the procurement process.[22]

However, there are signs of recovery. For example, two U.S. lease agreement concessions reached financial close in 2009; both are based on availability payment structures similar to that proposed for the DBFOM option in this report:

- I-595 Project, Fort Lauderdale, Florida, which closed in February 2009
- Port of Miami Tunnel Project, Florida, which closed in October 2009

There are also examples of DBF projects currently progressing in Florida:

- I-4 Connector Project, Tampa, Florida, achieved Financial Close in December 2009
- SR826/SR836 Interchange, Florida, due to begin construction late 2009
- US 1 Project, Florida, in construction

Furthermore, in Canada there are several highway P3 transactions based on availability payments that are currently in the bid phase, and similar transactions have occurred in the past. The following is a representative sample:

- South Fraser Perimeter Road, Vancouver, British Columbia – bid phase
- Stoney Trail Project, Calgary, Alberta – bid phase
- Highway 1 Project, New Brunswick – bid phase
- Golden Ears Bridge, Vancouver, British Columbia – in construction

[22] In early September 2009, the Mississippi Department of Transportation announced that because of considerations of toll revenue projections and risks in the context of the credit crisis, it has suspended the procurement process for the state's first toll road to be built as a P3. In April 2009, the winning bidder for the privatization of $2.5 billion Midway Airport was unable to meet the deadline for financial close and was then forced to forfeit a $126 million non-fundable payment to the City of Chicago when it could not solicit debt on acceptable terms to complete the transaction. Both projects have exposure to demand risk in their revenue streams which in the context of the financial market crisis has proved to be especially difficult to finance.

- Sea to Sky Highway, Vancouver, British Columbia – construction completed in 2009
- Okanagan Lake Bridge, Kelowna, British Columbia – construction completed in 2009

Importantly, we have not included demand risk in the DBFOM revenue stream, which is a positive when assessing the bankability of the Project as it was a major factor in the failure of the demand risk projects mentioned above.

The DBF and DBFOM shadow bid models assume that a concessionaire will be able to secure senior debt at acceptable terms.

3.7.2 Financing Terms

DBB

In the DBB case, there is no financial structure, because all costs are paid for by the public sector as they are incurred.

DBF

In the DBF case, construction is financed by a single commercial loan and an equity contribution from the contractor and/or another private finance partner.

The debt is repaid in part by a single milestone payment at the end of Contract 7, and further repayments over a period of 7 years (10 years from the start of construction). These payments would also cover the amounts due to equity participants. O&M are paid for separately by the public sector.

DBFOM

In the DBFOM case, construction is financed by two debt issues—a commercial senior loan and a TIFIA loan issued by the U.S. Department of Transportation (USDOT)—plus an equity contribution from the private finance partner. In some cases, the private finance partner includes the construction subcontractor.

The senior debt is repaid in part by a single milestone payment at the end of Contract 7. The remainder of the senior debt, the TIFIA debt, and the equity are repaid by semi-annual availability payments made over the 30 year operating period.

In addition, the availability payments meet the cost of O&M.

In the base case, the strategy adopted for the financial structure of both the DBF and DBFOM was to avoid the need for refinancing. There is no refinancing risk in either option, as the senior debt is paid off before the maximum period accepted by the current market.

On the other hand, it is likely that as market conditions improve between now and financial close, longer loan periods may be accepted, and there are signs of the market improving. For example, margins on bank loans have already been observed to come down by around 100 basis points (bps) over the span of recent comparable transactions.

The analysis has adopted a conservative approach to the financial structures, as it does not assume the use of Private Activity Bonds (PABs). This is due to the current market conditions being less supportive of insured long-term project finance bond issues. This may change if the market improves between now and financial close.

Comparing the financial assumptions used in the DBFOM model for the Project with publically available information on the Port of Miami Tunnel Project shows that the financial structure considered in this report, including the pricing of debt and equity, is very similar. A detailed comparison of the two projects is provided in Appendix I.

Exhibit 38 shows a summary of the assumptions used for the DBFOM and DBF financial models. These assumptions are based on informal market soundings and reflect current market conditions.

Exhibit 38: Financial Assumptions for the DBFOM and DBF Options

Category	DBFOM	DBF
Senior debt (bank term loan)		
Margin	300bps	250bps
Upfront fees	300bps	250bps
Commitment fees	120bps	100bps
Loan duration	Maximum of 10 years	Maximum of 10 years
Refinancing risk	Private sector, funded at close	Public sector
Proportion of capital structure	Balancing figure	90%
Drawdown	Pro rata with TIFIA after equity	After equity
DSCR	1.2	Reserves
TIFIA Debt		
Interest rate (Sept. 2009)	4.15%	N/A
Capitalized interest period	Until end of construction	N/A
Repayment period	27 years	N/A
Proportion of capital structure	33% of eligible costs	N/A
Drawdown	Pro rata with senior debt after equity	N/A
Equity		
Proportion of capital structure	10%	10%
Drawdown	Before senior debt and TIFIA	Draw down to fund upfront fees and after public sector milestone payments
Required return	11.5%	18.5%
Distribution start date	After repayment in full of senior loan	After repayment in full of term loan
Distribution rules	No distribution until all reserves are funded	No distributions until senior debt is fully repaid
Milestone payments	$150m at the end of Contract 7	$150m at the end of Contract 7

Note: The TIFIA interest rate fluctuates with the State and Local Government Series rate
Source: Arup

3.7.3 Discount Rate

Money today has greater value than money in the future. To represent this, the public cash flows that pay for the Project must be discounted to produce a NPV to be compared in the VfM analysis on an equal basis.

The base case for each of the procurement options uses a discount rate of 8.5 percent, which represents the pre-tax, time-weighted WACC of the DBFOM option (See Appendix G for an explanation). Several governments worldwide, including those in Canada and Australia, which are sponsoring P3 projects, derive the discount rate for their VfM evaluations using this method.[23]

[23] Partnerships British Columbia, Canada, "Quantitative Procurement Analysis," August 2009 / Project Evolution Guidelines, Department of Treasury and Finance, Government of Western Australia, August 2005.

3.7.4 Taxation

DBFOM Income Tax

In the DBFOM option, concession income is subject to federal and state taxes. The marginal state and federal tax rates are 35 percent and 9 percent, respectively. As state taxes are deductible against federal taxes, the resulting all-in marginal tax rate is approximately 41 percent.

Tax Treatment of Capital Assets

As the construction period is longer than one year, the Project is classed as a long-term contract, and therefore its capital assets are subject to the Percentage Completion Method (PCM) in accordance with standard tax calculation practices.[24] Under the PCM, the portion of concession income relating to construction (the milestone payments and approximately 33 percent of the total availability payments) must be recognized during the construction period, in order to match the timing of the construction costs.

As a result, the concessionaire pays no tax during construction, does not carry any tax losses forward into operations, and cannot offset depreciation from capital assets against income to reduce its tax burden. This means that the concessionaire begins paying tax as soon as operations begin.

Tax Adjustment in the DBB and DBF Options

In the DBFOM option, the concessionaire pays income tax, which is accounted for as a cost in the financial model. However, this tax is received by the government as revenue (both state and federal), and this would partially offset the net cost of the Project from the public perspective.

In the DBB and DBF options the government would not receive the tax income that it would under the DBFOM option. To produce a fair comparison between options, an adjustment is made to reflect the loss of tax as an opportunity cost in the DBB and DBF relative to the DBFOM option. This is in accordance with international P3 practice for VfM analysis and is discussed fully in Partnership British Columbia's "Methodology for Quantitative Procurement Options Analysis Discussion Draft," August 2009, under the concept of "competitive neutrality" of public and public-private procurement options.

Because the Project is partially funded by federal money via the federal payment of the TIFIA subsidy, and because of the reliance on federal involvement through the TIFIA loan itself, both state and federal tax rates are included in the tax adjustment, which amounts to an NPV of $36 million.

The result is that tax is neutral across all of the delivery options. Therefore, there is no tax item in any comparison chart between the DBB and the DBF or DBFOM alternatives.

Tax Treatment of Construction Contracts

Construction costs in each option are assumed to contain an element of profit for the contractor, which is subject to income tax. This cost is not modeled separately and is assumed to have an equal effect across the DBB, DBF, and DBFOM options.

3.7.5 Public Sector Fundraising

The funding partners have committed funds to the construction of the Presidio Parkway on the basis of the cost estimates in the FHWA Initial Financial Plan, May 2009. The FHWA does not require this plan to include the costs that some of the funding partners may incur to raise these funds, such as bond issues or the securitization of toll and sales tax revenue streams. Therefore, these costs have not been included in the total cost of the DBB option in this report.

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[24] See "U.S. Tax Considerations in Transportation Public Private Partnerships," Ernst and Young, March 2007.

Chapter 4:

Quantitative Analysis

ARUP PB

joint venture

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4.1 QUANTITATIVE RESULTS

The total costs to deliver the Project under the DBB, DBF, and DBFOM delivery options are shown in Exhibit 39 below, as both total YOE$ and total NPV$. NPV amounts were determined using an 8.5% discount rate. (See Appendix G for more information on the discount rate.) Detailed breakdowns of these costs are included in the following sections.

Exhibit 39 shows that the DBB option is likely to cost the Project Sponsors the least in YOE dollars; a further breakdown is given in Exhibit 40. However, in NPV terms, the DBFOM option is likely to offer the Project Sponsors the best VfM by $147 million (NPV), which is 23 percent lower than the DBB option.

The DBF option is less cost-effective than the DBB in both YOE and NPV dollars. It is also less cost-effective than the DBFOM option in NPV terms.

This is not a like-for-like comparison of VfM, as the LoS delivered by each option is not the same—the difference in LoS between the DBB/DBF options and DBFOM option is explained in Section 3.6.3. Therefore, the value of qualitative benefits, as discussed more broadly in Section 2.4, must be taken into consideration when considering the VfM delivered by each option.

4.2 DESIGN-BID-BUILD

4.2.1 Financial Implications for the Project Sponsors

From the perspective of the Project Sponsors, the total of all the costs for the DBB option is $1,391 million (risk-adjusted, YOE$). A further detailed breakdown is shown in Appendix H.

Exhibit 39: Total Cost of Delivery

Delivery option	DBB	DBF	DBFOM
Total Cost (YOE$, Million)	1,391	1,654	1,969
Total Cost (NPV$ at 8.5%, Million)	635	642	488

Note NPV and YOE account for the 60-year maintenance and rehabilitation cash flows
Source: Arup/PB

Exhibit 40: Year-of-Expenditure Total Costs (2010 to 2070)
(YOE$, Million)

	DBB	DBF	DBFOM
Total sum of nominal dollars (concession term, 2010 to 2043)	974	1,237	1,378
O&M and replacement and rehabilitation (2044 to 2070)	417	417	591
Total sum of nominal dollars (2010 to 2070)	1,391	1,654	1,969

Source: Arup/PB

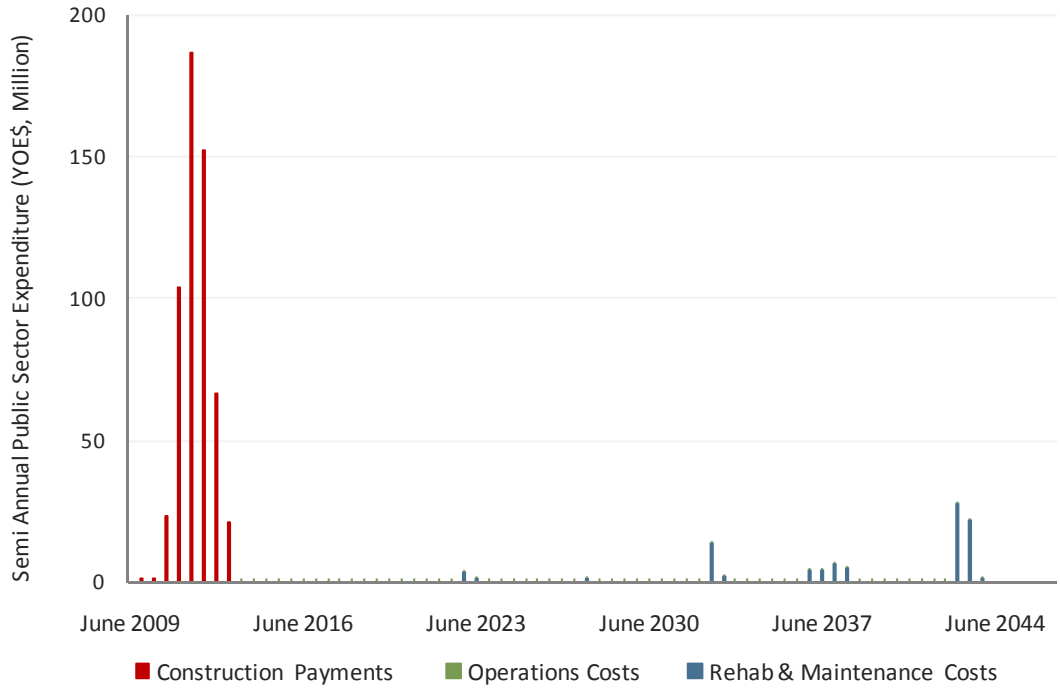
The cash flow follows a conventional pattern of costs incurred by the Project Sponsors, illustrated in Exhibit 41:

- Construction oversight and transaction costs of $96 million (YOE$) are paid by the Project Sponsors between 2009 and 2013, when construction is assumed to be complete.
- An estimated risk reserve of $125 million (2009$) is retained to fund contract variations arising from risks that are retained by the Project Sponsors (for example, risks associated with Phase II being awarded as four separate contracts). This cost is assumed to be incurred between 2010 and 2013.
- Construction costs are estimated to be $458 million (risk-adjusted, YOE$), payable throughout the construction phase (between 2010 and 2013). These payments will be made in response to invoices presented by the construction contractors and approved by the Project Sponsors.
- Operations, routine maintenance, and rehabilitation costs over the operational forecast period is $545 million (risk-adjusted, YOE$) across the 60-year O&M forecast period.
- An adjustment for tax of $167 million (YOE$) incurred between 2013 and 2043 to represent taxes forgone at the state and federal levels.

Due to the absence of construction financing in the contractual structure assumed in the DBB option, Project Sponsors will be required to fund all construction, oversight, and transaction costs, and potential cost overruns from 2009 to 2013. Using the above methodology, these sum to an estimated $679 million (YOE$) for Phase II.

There currently is a timing difference between some of the previously committed sources of funding and the construction schedule. This could result in construction delays that could increase the cost of undertaking the Project and could constrain users' benefits. The estimated $679 million required between 2009 and 2013 for the DBB option also exceeds the $473 million that has been allocated for Phase II of this Project to date.

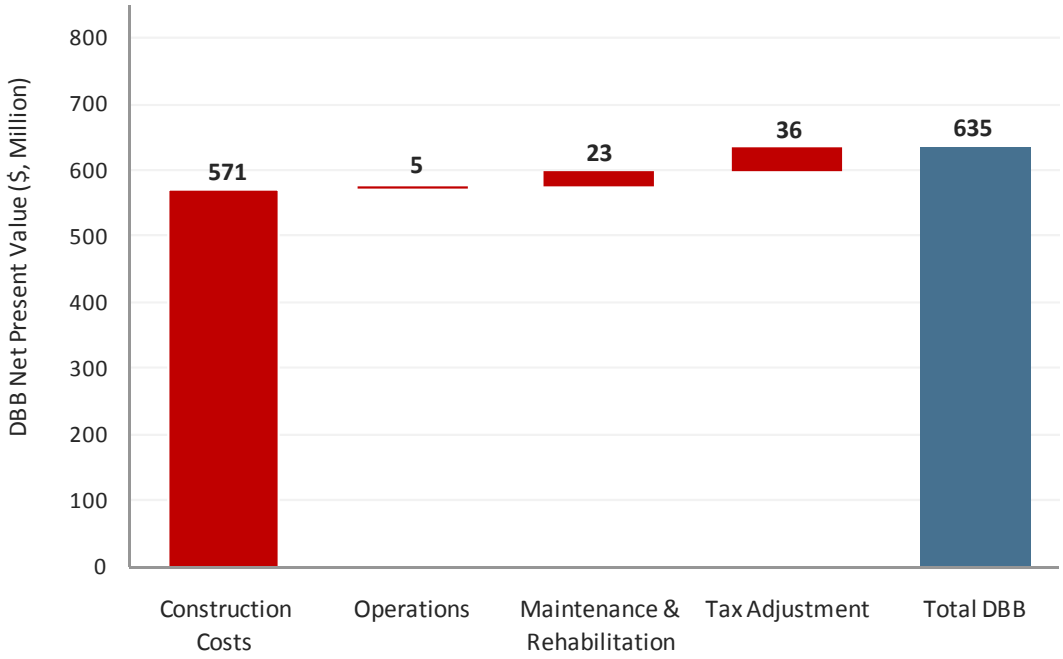
Exhibit 41: DBB Project Sponsors' Semi-Annual Cash Outflows[25]



Note: Construction costs only include the costs for Contracts 5 through 8 of the Project.
Source: Arup

[25] Excluding $12.5 million in sunk costs common to all three options.

Exhibit 42: DBB Net Present Value Cost Build-up



Note: Construction costs only include the costs for Contracts 5 through 8 of the Project.
Source: Arup

4.2.2 Value for Money Analysis

The NPV of the DBB option cash out flows for the Project Sponsors is $635 million to the end of the 60-year O&M forecast period.

As shown in Exhibit 42, this NPV total consists of:

- Project risk-adjusted construction costs of ($571 million)[26]
- Operations ($5 million),
- Maintenance and Rehabilitation costs ($23 million),
- Tax adjustment ($36 million).

The tax adjustment included in the DBB option is described in detail in Section 3.7.4.

4.3 DESIGN-BUILD-FINANCE

4.3.1 Financial Implications

Exhibit 43 shows the estimated cash flows from the standpoint of the Project Sponsors, if the Project were delivered through a DBF solution.

The total estimated cost to the Project Sponsors of delivering a DBF solution between 2009 and 2043 would be $1,654 million (YOE$). This cost to the Project Sponsors consists of the following:

[26] The risk-adjusted construction costs of $571 million consist of construction payments of $369 million, oversight and construction costs of $77 million, and a public sector risk reserve of $125 million.

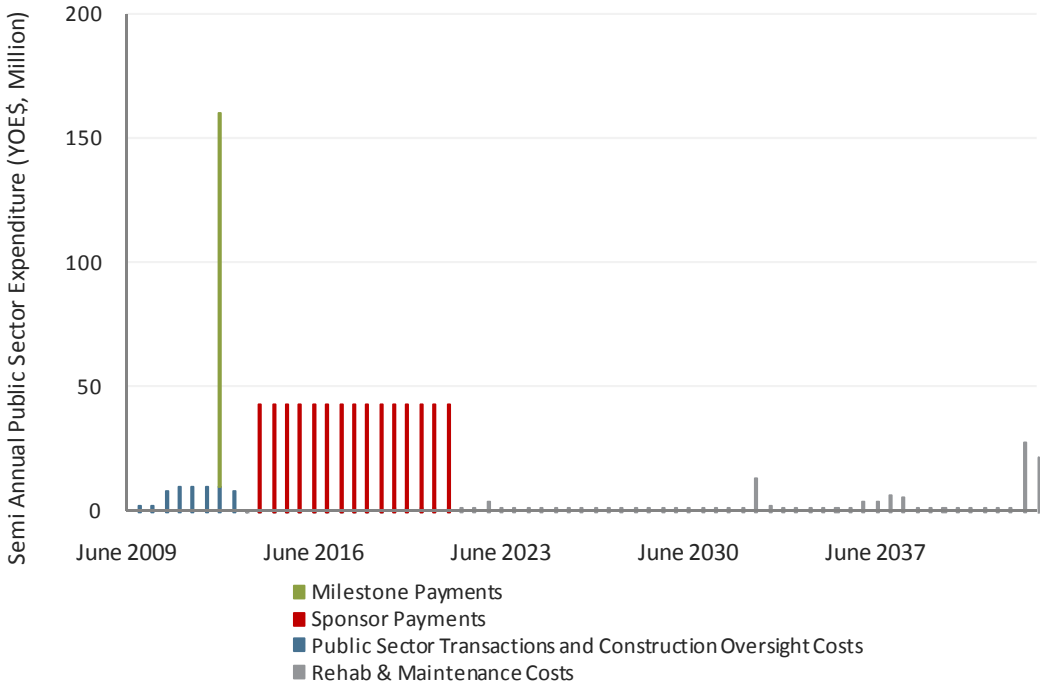
- $61 million (YOE$) in project transaction and construction oversight costs incurred between 2009 and 2013, when construction is expected to be complete
- A single $150 million (YOE$) milestone paid to the private sector parties at the end of December 2012 when contract 7 is expected to be complete
- A total of $640 million (YOE$) in Project Sponsor payments, to repay the balance on the construction loan and to provide return on the contractor's equity investment
- Operations costs totaling $52 million (YOE over the 60-year O&M forecast period)
- Maintenance and Rehabilitation of the road totaling $494 million (YOE$) between 2013 and 2044
- A public retained-risk reserve of $91 million (YOE$)
- An adjustment for tax of $167 million (YOE$)

4.3.2 Value for Money Analysis

As shown in Exhibit 44 on page 50, the total NPV of the DBF option comprises the sum of the following payment streams:

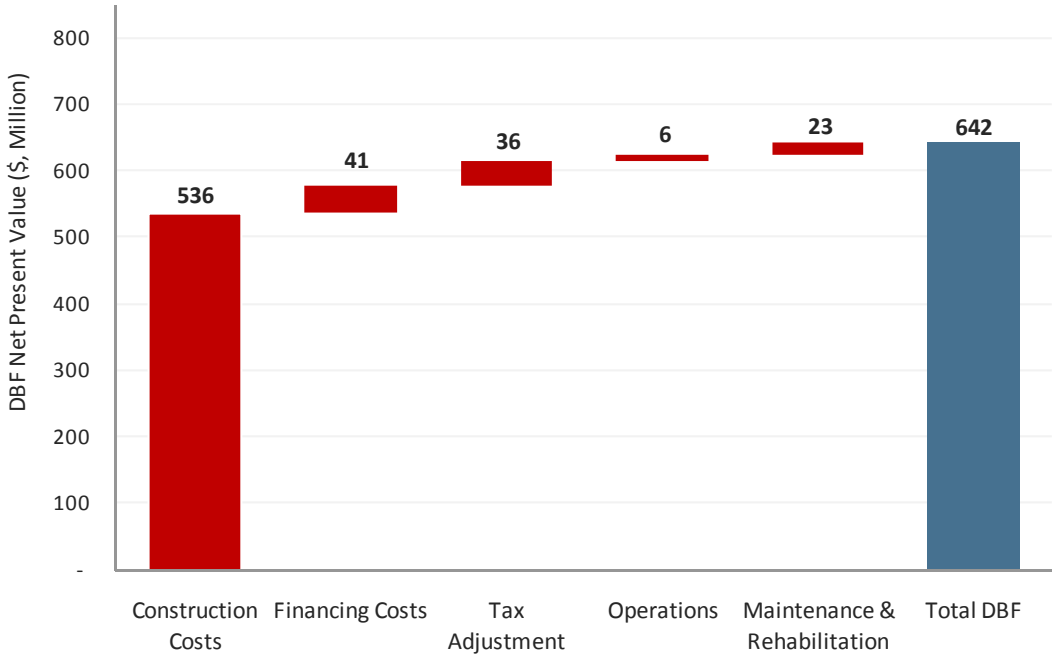
- Construction costs (NPV $536 million), which comprise:
  - Construction costs financed by the construction loan (NPV $282 million),
  - A single milestone payment made on final acceptance of Contract 7 in December 2012 (NPV $113 million),
  - Public sector transaction costs throughout the construction period and not financed by the design-build contractor (NPV $50 million) and a public retained risk reserve (NPV $91 million).
- Net finance costs (NPV $41 million) as the average cost of capital is higher than the discount rate, as discussed in Section 4.4.3
- An adjustment for tax revenues forgone as a result of a non-DBFOM solution ($36 million NPV) as explained in Section 3.7.4
- Asset operations, maintenance, replacement, and rehabilitation costs for the 60-year O&M forecast period (total NPV of $29 million)

Exhibit 43: DBF Project Sponsors' Semi-Annual Cash Outflows



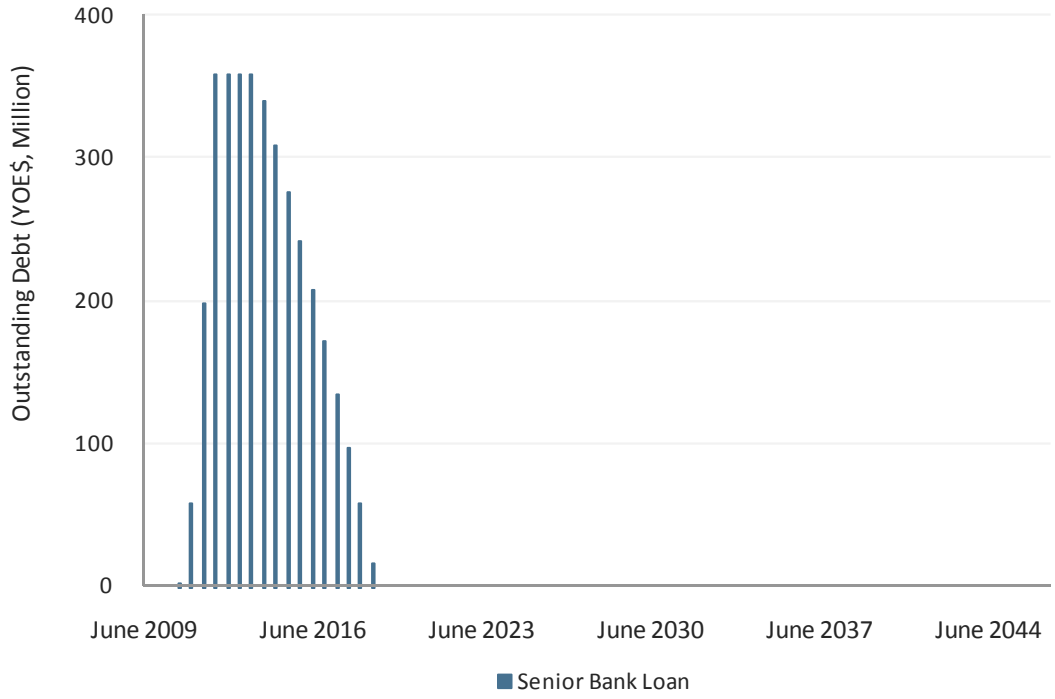
Source: Arup

Exhibit 44: DBF Total NPV Payment Build-up



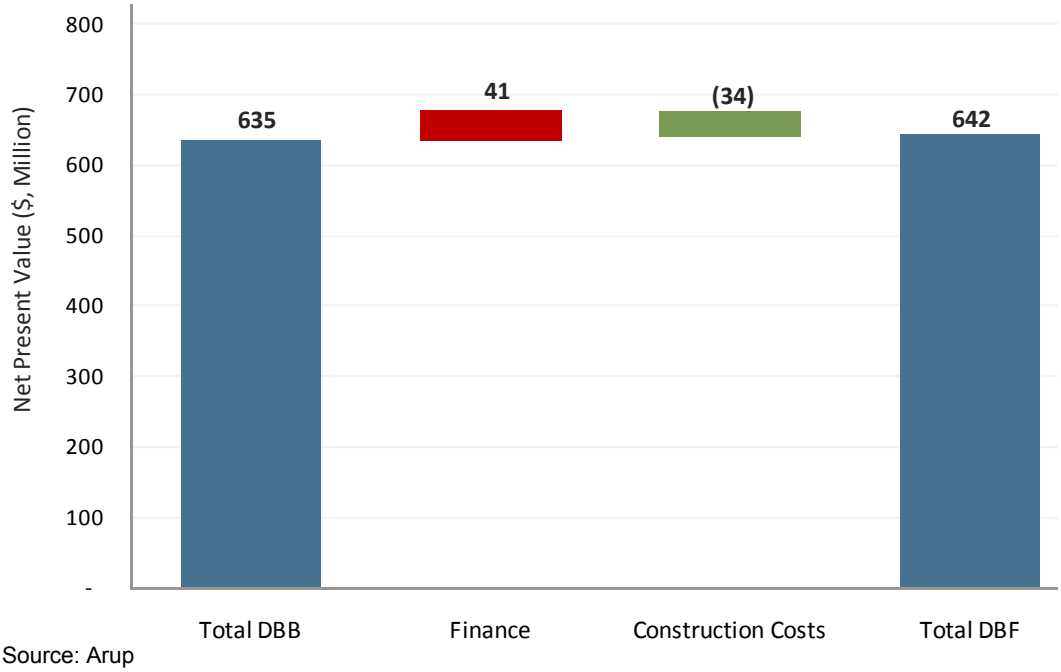
Note: Construction costs only include the costs for Contracts 5 through 8 of the Project.
Source: Arup

Exhibit 45: DBF Option Outstanding Debt Balance



Source: Arup

Exhibit 46: Comparison of NPV between DBB and DBF Options



Source: Arup

This preliminary risk assessment assumes that the public sector would retain additional risk totaling approximately $91 million (2009$) related to the construction contract over the three years of construction as discussed in Section 3.3.1.

As shown in Exhibit 46, the NPV of the sum of the Project Sponsors' costs for the DBF option over the analysis period is estimated at $642 million, which is 1 percent higher than the DBB option.

The difference between the DBB and DBF options is the net of savings in the DBF construction costs (NPV $34 million) and the additional DBF financing costs (NPV $41 million).

4.3.3 Milestone and Construction Loan Payments

The DBF option described in this report offers the Project Sponsors the opportunity to sculpt the number, timing, and sizing of the milestone and construction payments to match their expected revenues. The repayment structure chosen by the Project Sponsors will have to be agreed with the funding partners prior to financial close.

The financing repayment profile used for our analysis, shown in Exhibit 47, assumes the DBF contractor is able to secure a construction loan with a 10-year term, allowing the Project Sponsors to repay the construction loan over the seven years after the end of construction. We understand from market sounding discussions with construction contractors and financiers that there is currently limited market appetite for DBF deals with loans terms beyond seven years. Lenders are also likely to require higher margins on loans for DBF deals if the loan term is beyond five years. As a result, two recent construction financing deals to close in Florida used constructions loans with a five-year terms. However, this market is expected to change.

Given the improving market conditions, it may be possible to arrange a DBF option with a loan term of 10 years; however, the risk is that only shorter loan term may be achieved.

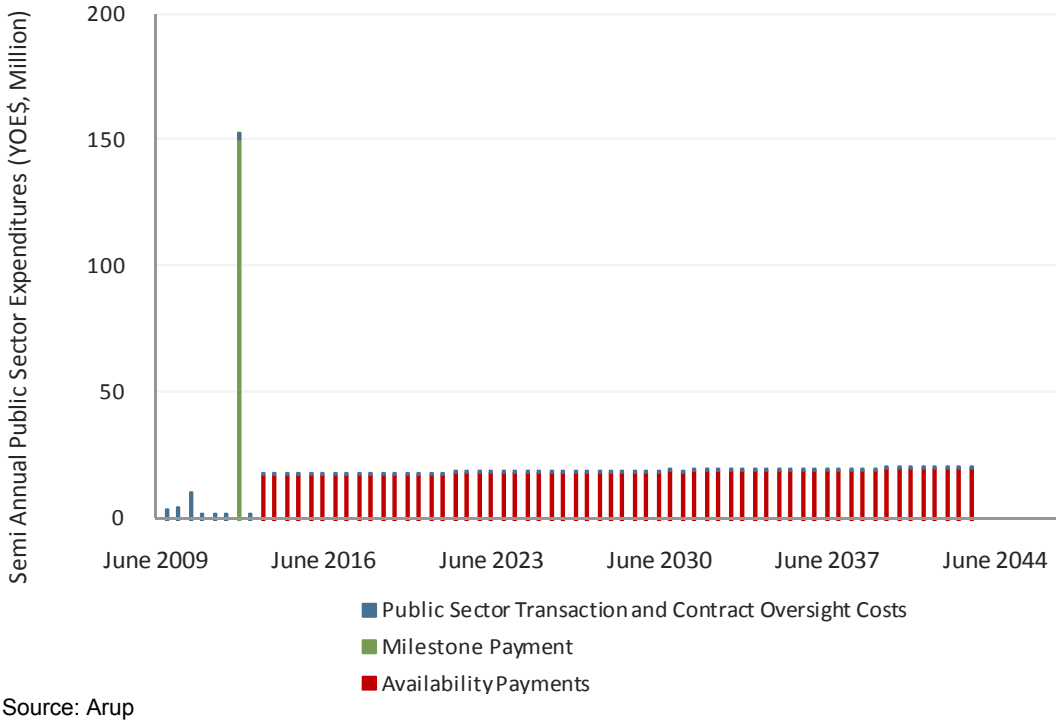
4.4 DESIGN-BUILD-FINANCE-OPERATE-MAINTAIN

4.4.1 Financial Implications

Exhibit 47 shows the Project Sponsors' projected cash flows under the DBFOM option. The total cost of delivery is $1,969 million (YOE$). The cash flows include the following costs from the perspective of the Project Sponsors:

- Public sector transaction and oversight costs during construction in the amount of $30 million (YOE$) plus oversight costs during operations of $19 million (YOE$)
- $47 million (YOE$) for owner's retained risk reserve
- $150 million (YOE$) as a single milestone payment at substantial completion
- $1,132 million (YOE$) as annual availability payments
- $591 million (YOE$) of public sector expenditure on operations, maintenance and rehabilitation after the assets are handed back in 2043

Exhibit 47: DBFOM Project Sponsors' Semi-Annual Cash Outflows



Source: Arup

Transaction costs correspond to the preparation of the concession documents, management of the procurement process, the Project Sponsors' own staff costs and consultant fees, and the Project Sponsors' oversight costs during construction. These costs are discussed in more detail in Section 3.

The owner's retained risk reserve is established prior to Financial Close and is drawn down if and when necessary during the construction period to fund contract variations as a result of the Project Sponsors retained risk. This reserve fund is intended to protect the Project Sponsor from retained risks, such as archeological risks and site access risks. Under the terms of the concession agreement contemplated in this report, these would be considered "contract variations" and would be compensated in time and cost by the Project Sponsors.

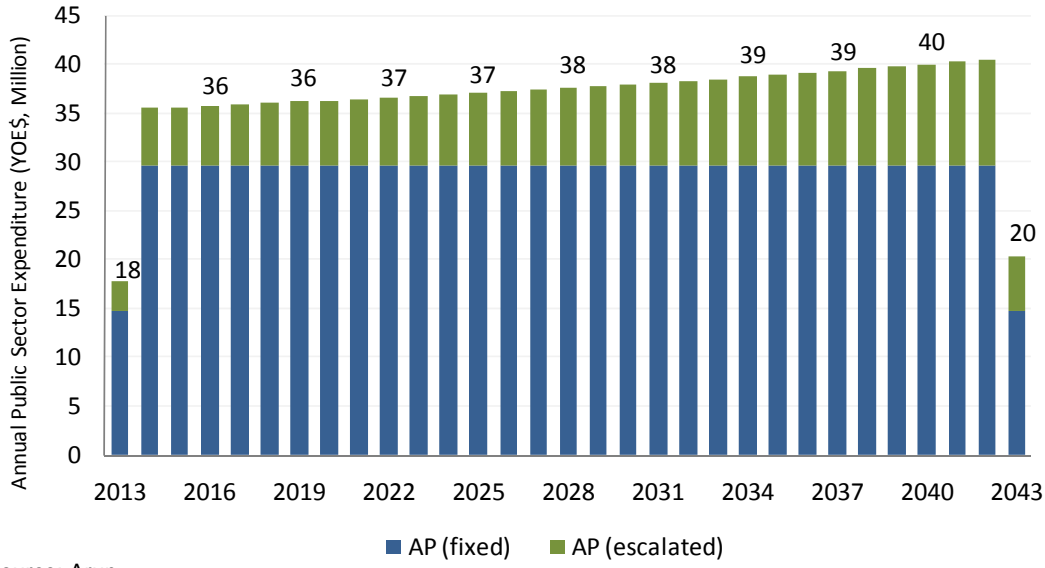
On completion of the work under Contracts 5 through 7, which in the FHWA Initial Financial Plan is scheduled to be completed in December 2012, a single milestone payment of $150 million (YOE$) is made to the DBFOM concessionaire. At that point, 94 percent of the construction costs will have been incurred, with only the work previously planned to be done under Contract 8 remaining to be completed. The construction risk related to the Contract 8 works is mitigated by the possibility of delaying the start of availability payments, i.e., linking the availability payments to any non-completion of construction works and restrictions on the application of funds from the milestone payment until after the completion of the work previously planned to be done under Contract 8.

Availability payments are assumed to be paid on a semi-annual basis, with the first payment being made at the end of the six month period starting July 2013 for $18 million (YOE$). Approximately 85% of the availability payments attributable to construction and financing costs would be fixed. The remaining portion (15%) of the availability payments, which are attributed to the operation and maintenance, would be indexed, as shown in

Exhibit 48, at the Consumer Price Index (CPI),[27] which is assumed to be 2.2 percent. This is to reflect the Project Sponsors retention of inflation risk on O&M and R&R costs.

The availability payment for the first full year of operation is estimated to be $35 million (YOE$), reaching $38 million in 2028 (mid-point of operations period), and is estimated to be $41 million in the last year of the concession in 2043. See Exhibit 48.

Exhibit 48: DBFOM Project Sponsors' Estimated Annual Availability Payments



Source: Arup

As noted, the availability payments are subject to compliance by the DBFOM concessionaire to the performance standards and specifications defined within the concession contract, with the Project Sponsors providing oversight of such compliance.

In addition to availability payments, the Project Sponsors would incur an annual cost over the 30-year operations period for on-going operational oversight of the DBFOM concessionaire, totaling $19 million (YOE$).

4.4.2 Value for Money

The NPV of the sum of the Project Sponsors' cash outflows over the DBFOM concession term is estimated at $488 million. This is comprised of the following payment streams, which are also shown graphically in Exhibit 49:

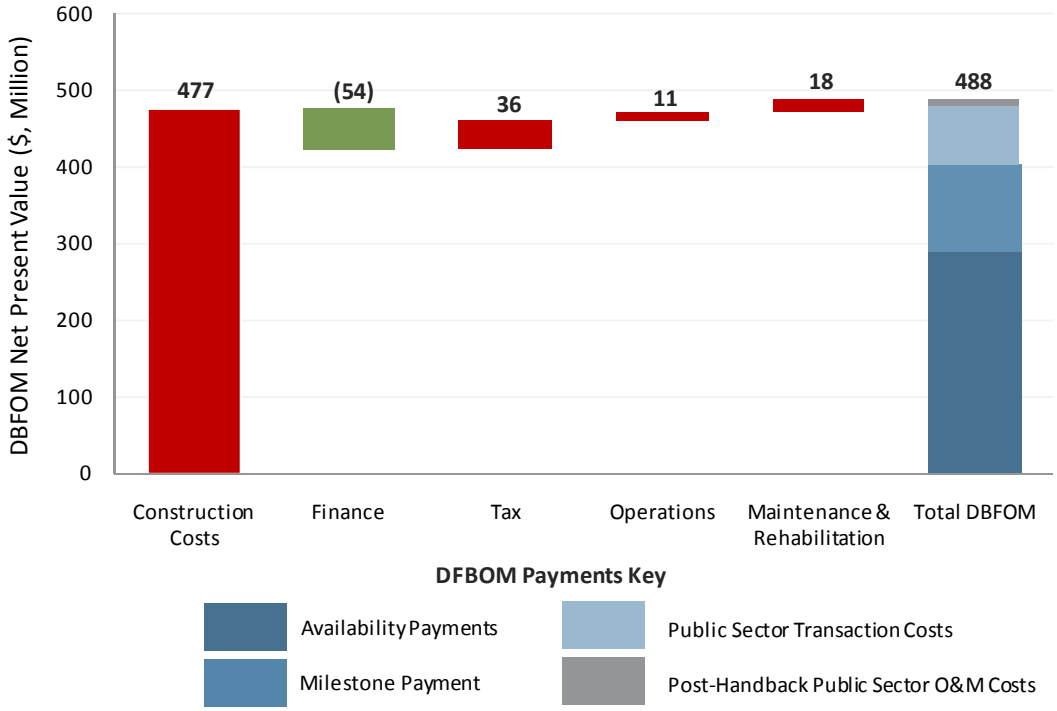
- Semi-annual availability payments (NPV of $289 million)
- One milestone payment at Substantial Completion (NPV $113 million)
- Public sector transaction costs throughout the concession term not financed by the DBFOM concessionaire (NPV $32 million) and a public retained risk reserve (NPV $47 million)
- Post handback operations, maintenance and rehabilitation costs incurred by the public sector (NPV $7 million)

Exhibit 49 also shows how the sum of the Project Sponsors' payments is used to pay for the various costs incurred by the DBFOM concessionaire, including:

[27] Source: Global Insight, 30 year CPI forecast for California. Note that according to the U.S. Bureau of Labor Statistics the U.S. average CPI was 3.7% per annum over the last 30 years and 3.3% per annum over the last 96 years (all data available since 1913).

- Capitalized costs including risk-adjusted construction costs and transaction costs incurred by the concessionaire (NPV $477 million),
- Financing charges (a negative NPV $54 million; see 4.3.2 for a detailed discussion),
- Taxes (NPV $36 million),
- Operation costs (NPV $11 million),
- Maintenance and rehabilitation costs (NPV $18 million).

Exhibit 49: DBFOM NPV Build-up



Note: Construction costs only include the costs for Contracts 5 through 8 of the Project.
Source: Arup

Exhibit 50 shows that, under the base case assumptions presented in the Executive Summary, the DBFOM option is estimated to cost the Project Sponsors $147 million less in NPV terms than the DBB option over the 33-year concession term of the Project. This represents an approximately 23 percent cost savings of the DBFOM option relative to the DBB option.

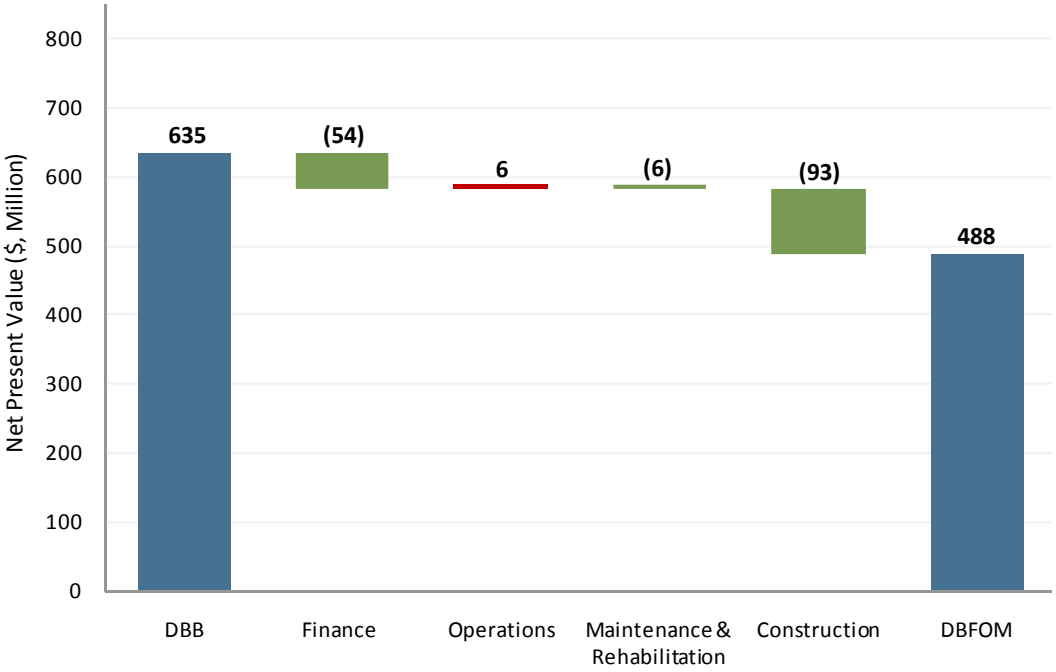
The NPV of the cost saving is based on:

- Lower risk-adjusted construction and oversight costs (NPV -$93 million),
- More efficient preventative maintenance asset management program during operations in relation to maintenance and rehabilitation costs (NPV -$6 million) which is offset from a lack of economies of scale by higher operating costs, (NPV +$6 million),
- The NPV impact of spreading the financing over the 30-year operations phase of the concession at a lower (after tax) cost of capital than the discount rate (NPV -$54 million).

The differential in the risk-adjusted construction cost in the DBB and the DBFOM (NPV $93 million) is the largest contributor to the difference between the total NPV of the DBB and DBFOM options, followed by reduced finance costs (NPV $54 million).

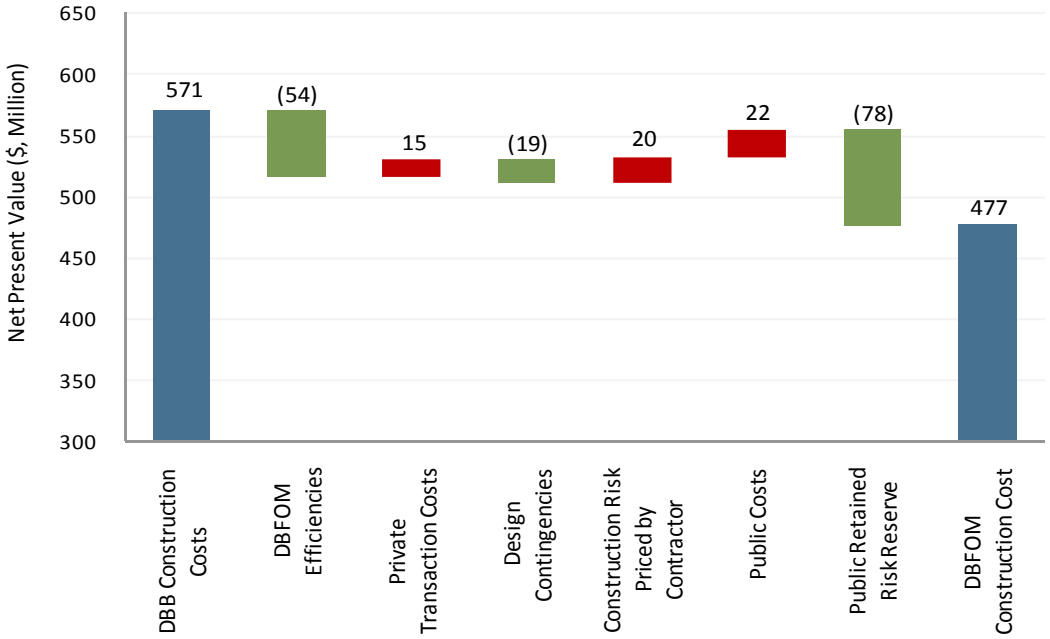
The differential in the risk-adjusted construction cost in the DBB and the DBFOM (NPV $93 million) is the largest contributor to the difference between the total NPV of the DBB and DBFOM options, followed by reduced finance costs (NPV $54 million).

Exhibit 50: Comparison of DBB and DBFOM Costs



Note: Construction costs only include the costs for Contracts 5 through 8 of the Project.
Source: Arup

Exhibit 51: Comparison of Construction DBB and DBFOM Costs



Note: Construction Costs only include the costs for Contracts 5 through 8 of the Project.
Source: Arup

4.4.3 Cost of Finance

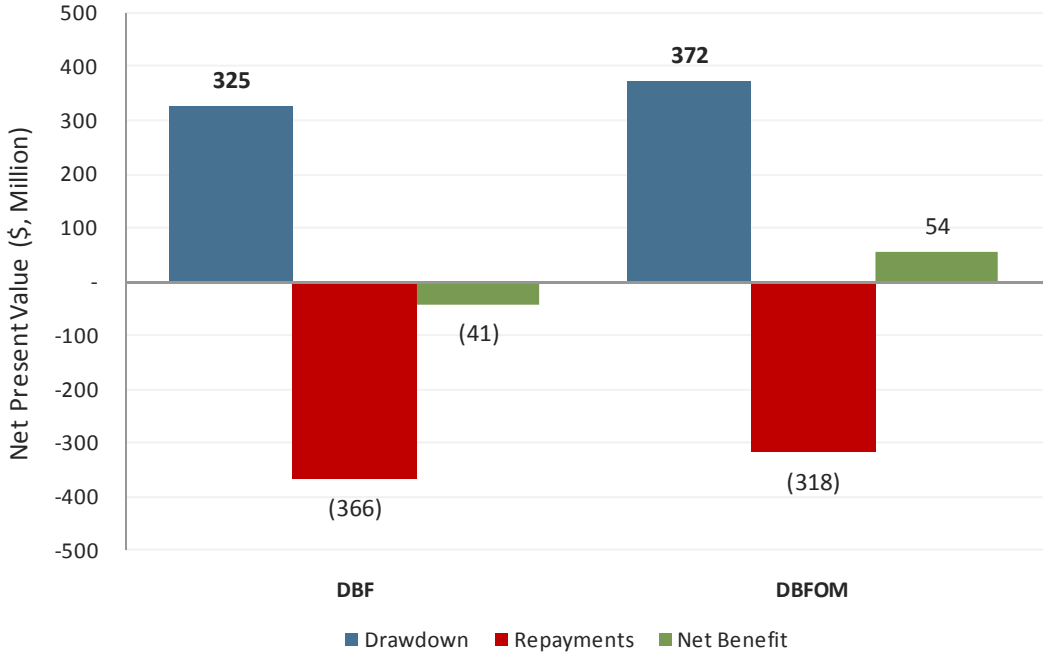
The finance element in the NPV buildup for the DBF is shown as a $41 million cost in Exhibit 44, whereas the NPV buildup for the DBFOM shows the finance element as a $54 million benefit in Exhibit 50. This is because of the relationship between the cost of capital assumed for each option, and the discount rate used to calculate the NPVs of the options.

The finance structure in the DBF and the DBFOM options spread the cost of construction using debt and equity, which are repaid over a period of time, 10 years in the case of DBF, and 30 years for the DBFOM. Spreading the payment incurs a cost—in the case of debt the cost is paid through annual interest and upfront fees, in the case of equity funding the cost is the dividend. These costs are called the cost of capital, and are expressed as a percentage rate based on the amount loaned or invested.

In both cases, the finance brings a cost in YOE$, as the interest and dividends is in addition to the cost of construction. But in order to create an NPV, future cash flows are discounted to a certain point in time, using a discount rate (the choice of discount rate is discussed in Appendix G). If the cost of capital is higher than the discount rate, then the project financing results in a net cost, because the finance is more expensive than the benefit of spreading payments over time.

This is the case in the DBF, which is financed by relatively expensive bank debt, and has a post-tax, time-weighted WACC of 8.9% against a discount rate of 8.5% in the base case. For the DBFOM, however, the opposite is true. A large amount of relatively cheap TIFIA loan means that the post-tax time-weighted WACC is equal to 6.5%, which is less than the discount rate for the NPV analysis;[28] therefore spreading payments over time results in a benefit, and every extra year of spreading the cost results in a larger benefit.

Exhibit 52: DBFOM Drawdown and Repayment



Source: Arup

[28] This is not the same as the pre-tax, time-weighted WACC as quoted in Appendix G (8.5 percent). The pre-tax, time-weighted WACC excludes the effect of tax in order to compare the options on a like-for-like basis. The post-tax, time-weighted WACC considers all costs to the project.

Exhibit 52 above shows the net NPV impact of the finance structures in the DBF and DBFOM options, as a sum of the drawdown of debt and equity, and the repayment including interest and dividends, as discounted over time.

The financing cost/benefit is driven by the balance between the cost of capital (i.e., the interest rate of debt or the rate of return required on equity) and the discount rate used to produce the NPV.

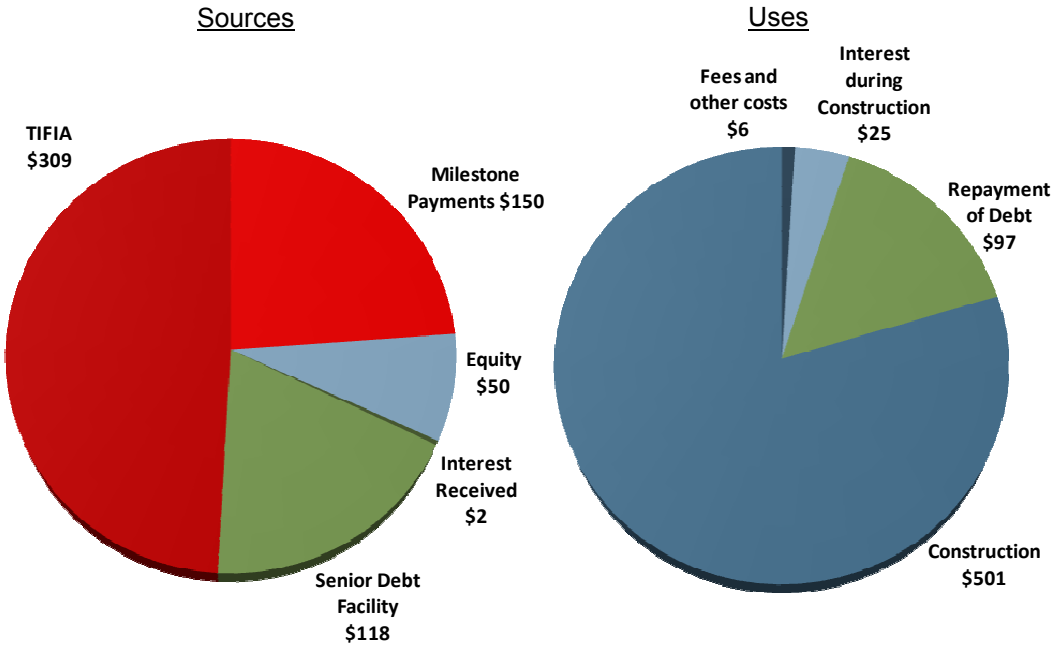
For example, the cost of equity (at 11.5 percent in the base case) is higher than the discount rate (8.5 percent in the base case) so equity has a net financing cost against the DBFOM option as compared with the DBB option. On the other hand, the TIFIA debt (with an assumed interest rate of 4.15 percent) would cost less than the discount rate and is therefore a net benefit for the DBFOM option as compared with the DBB option.

4.4.4 Concessionaire Sources and Uses of Funds

Exhibit 53 shows that the DBFOM concessionaire's sources and uses of funds up to the end of construction. At the end of construction, $50 million (YOE$) of equity is forecast to have been invested, and $427 million of debt drawn down, split between TIFIA ($309 million) and senior bank debt ($118 million). The majority of this would be used to pay for construction, with the remainder paying for the upfront fees associated with issuing the debt, and interest accrued on the debt during construction.

At the end of Contract 7, a one-time milestone payment of $150 million (YOE$) is assumed to be paid to cover for the remainder of construction and to pay down $97 million of the senior debt.

Exhibit 53: DBFOM Concessionaire Construction Sources and Uses of Funds at the End of Construction

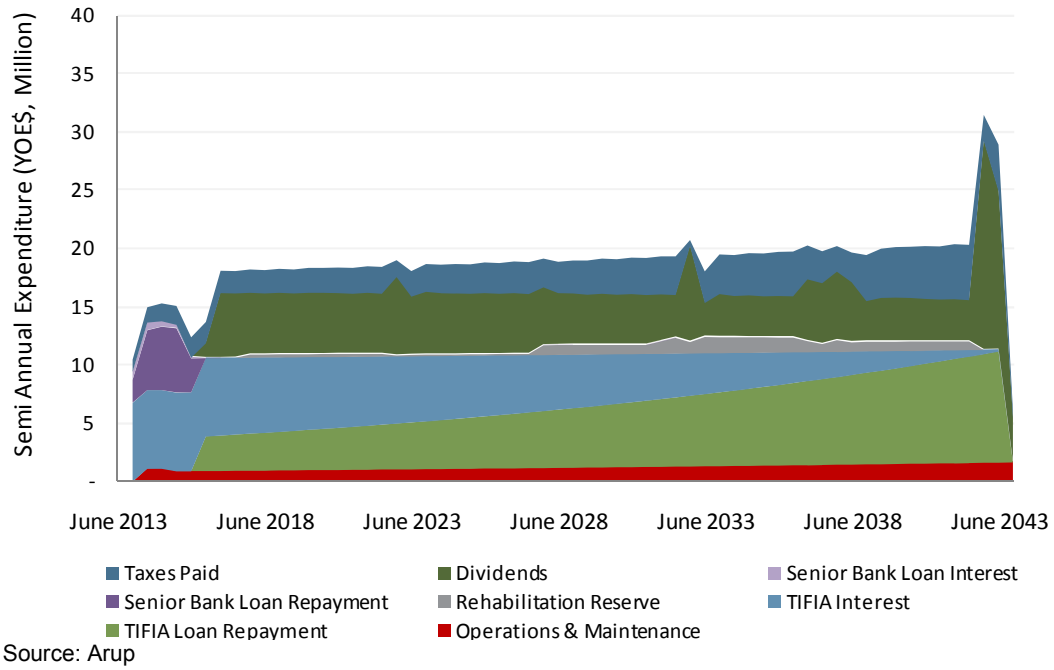


(YOE$, Million)
Source: Arup

During the operations period, the concessionaire's sources of funds (i.e., the revenue) are the availability payments plus interest received on reserve accounts. Exhibit 54 shows that, in this scenario, senior debt is repaid within 3 years. During this period, interest payments are made on the TIFIA loan but no principal is repaid.

Operation and routine maintenance costs and contributions to rehabilitation reserve accounts typically represent a relatively small portion of the use of funds, but increase with inflation throughout the operating period. Thus, a corresponding portion of the availability payment is escalated in line with inflation to account for this cost increase. In the forecast, contributions to rehabilitation reserves start at the beginning of the operations period, but increase substantially in 2027 to pay for upcoming rehabilitation costs in the tunnels.

Exhibit 54: DBFOM Concessionaire Use of Funds during Operations



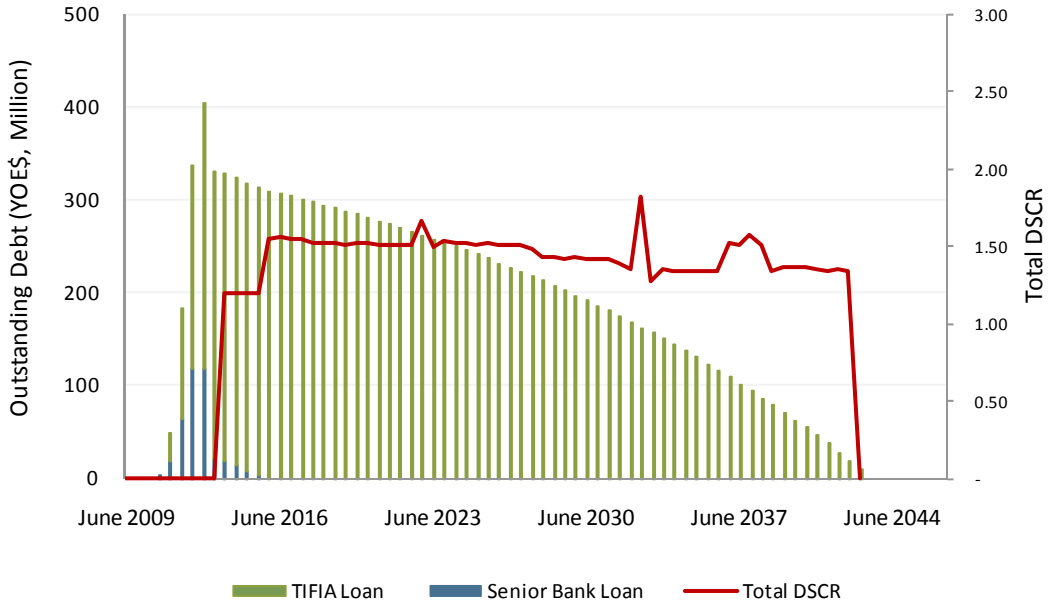
Source: Arup

Exhibit 55 shows the evolution of the outstanding debt balance throughout the concession term for the DBFOM scenario. The senior bank debt and TIFIA loans are drawn down together throughout the construction period, after the drawdown of equity. The repayment schedule is sculpted to repay the senior loan as quickly as possible while maintaining a minimum DSCR.

Upon final acceptance, the forecasts show the outstanding senior loan balance is reduced to approximately $21 million following receipt of the milestone payment at substantial completion. The model assumes the milestone payment made at substantial completion will be subject to the order of payment provisions during construction in the loan agreements, which prevents repayment of the senior debt principal until after final acceptance. The senior debt is fully repaid by 2016, i.e., less than 10 years from the assumed date for financial close.

Following repayment of the senior loan, the TIFIA loan is repaid throughout the remainder of the operations period.

Exhibit 55: DBFOM Concessionaire Debt Balance and Debt Service Coverage



Source: Arup

4.5 TIFIA

4.5.1 Program

The lowest cost funding available for the DBFOM option is a low cost form of junior debt provided by the USDOT under the Transportation Infrastructure Finance and Innovation Act of 1998 (TIFIA). The objective of the program is to encourage innovation and private investment in transportation projects. This allows an optimized use of more expensive commercial bank debt and equity.

The long-term authorizations in the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU), including TIFIA, expired on September 30, 2009. It is currently expected that reauthorizing this legislation could be delayed by as much as 18 months. Pending reauthorization, short term extension bills have been passed.

The reauthorization bill currently under consideration in the House Transportation and Infrastructure Committee would continue the program at a funding level to be determined when the bill comes to the floor. The Senate Environment and Public Works Committee has not moved on a long-term bill, but their proposed 18-month extension would continue TIFIA at its 2009 levels. Despite the uncertainty, lending is continuing. For example, the Transbay Terminal achieved financial close for a $171 million TIFIA loan on January 26, 2010.

In pending appropriations bills, neither the House nor the Senate would put any limitation on use of authorized funds, indicating continuing support for the program at this point. Moreover, as a contract authority program, it is not necessary for the Appropriations Committee to act on TIFIA, although, assuming the program is reauthorized, any new projects for 2010 would await the passage of the authorization act or extension.

Some additional TIFIA lending authority was created in the American Recovery and Reinvestment Act of 2009 and is being offered to project applicants as a part of the Transportation Investment Generating Economic Recovery grant program.

4.5.2 "Springing Lien"

The conditions of the TIFIA loan include a "springing lien." Under normal circumstances, the TIFIA loan is subordinated to the senior loan for dividend and principal repayment. However, in the event of a material adverse change in a debtor's financial condition, a loss of an investment grade credit rating, or a default under a credit facility, the TIFIA loan attains *pari passu* ranking with the senior loan.

This alignment of interest creates incentive for commercial banks to undertake the appropriate level of due diligence to ensure the appropriate risk allocation, in effect acting in the interests of TIFIA and the Project Sponsors.

4.5.3 Debt Sizing

The TIFIA statutes require that the maximum size of a TIFIA loan is 33 percent of the eligible costs of a project,[29] which includes construction costs, design costs and various other costs such as capitalized interest charged by a senior loan. Based on informal market soundings, we have assumed that the TIFIA loan in our DBFOM base case will be based on 33 percent of eligible costs from Contracts 1 to 8, as this represents one single project procured in two separate phases, and the DBFOM concessionaire would take over responsibility for operating the assets constructed in all contracts.

Furthermore, the work for Contracts 1 to 8 was part of the same FEIS/R and was certified by the relevant agencies under the same Record of Decision. Therefore, under TIFIA guidelines, all project costs associated with Contracts 1 to 8 are considered eligible from that perspective. Note that the Consultant Team has not included in eligible costs any of the cost of developing the FEIS/R, which is a conservative assumption at this point.

This allows a larger TIFIA loan than would be available if only sized on Contracts 5 through 8. As TIFIA debt is cheaper than commercial bank debt, this improves the cost of capital of the Project and reduces financing costs.

As an example, the North Tarrant Expressway in Texas reached financial close on December 17, 2009. The total debt on the project of $1.05 Billion was made up of $400 million in unwrapped Private Activity Bonds (PABs) and $650 million TIFIA Loan, which represents approx 62% of the total debt.

The DBFOM option base case assumes that the TIFIA loan will be the larger of the two debt issues used to finance the Project. According to the statutes governing the TIFIA program, this assumption is feasible provided that the TIFIA loan receives an investment grade rating.

In addition, there is a risk that the TIFIA loan may not receive an investment grade rating. Therefore, we have also considered the impact on the NPV of the total cost of the DBFOM option if the TIFIA loan were to be equal in size to the senior debt.

4.6 MILESTONE AND AVAILABILITY PAYMENTS

The DBFOM payments that the DBFOM Concessionaire receives include the following:

- A milestone payment at substantial completion of the work previously planned to be completed under Contracts 5 through 7 works and once the new facility is available to traffic
- Availability payments over a 30-year operating period after satisfactory completion of the work, including the landscaping, O&M mobilization, and final acceptance of the facility, subject to performance

[29] USC 23, Chapter 6, approved on October 4, 2005, 603(b)(2), states that: "Maximum Amount.- The amount of the secured loan [TIFIA loan] shall not exceed the lesser of 33 percent of the reasonably anticipated eligible project costs or, if the secured loan does not receive an investment grade rating, the amount of the senior project obligations."

Substantial completion (milestone payments) and final acceptance (start of availability payments) should be certified by an independent engineer appointed by the Project Sponsors and the concessionaire jointly.

4.6.1 Milestone Payment

In this analysis, the milestone payment is assumed to be sized based on two criteria:

- To reduce the outstanding balance of the senior bank debt to a level which could be completely amortized within the maximum tenor acceptable by the market, (currently 10 years)
- To ensure that the senior bank debt has a tenor that exceeds the construction period, in order to ensure that the commercial banks are exposed to both the construction and operating periods

If the Project Sponsors decide to pursue a DBFOM procurement, they would also need to consider the following:

- The timing of funding contributions from the funding partners while taking account of the cost of funding delayed payments
- That bidders may suggest more efficient financing structures

In addition to estimated construction and financing costs, the DBFOM milestone and availability payments would pay for on-time and on-budget project delivery, insurance, risk share on latent defects, risk transfer, and for O&M of the facility.

As per the terms of the current funding arrangements among the funding partners, these costs would be the responsibility of the Department in the DBB option. The arrangements for funding these costs with a DBFOM option would need to be agreed among the funding partners.

4.6.2 Availability Payments

Availability payments are assumed to start at final acceptance, which would be at the completion of Contract 8 (i.e., landscaping). The certification of final acceptance which triggers the start of the availability payments is subject to close out of the punch-list for the construction work previously planned to be done under Contracts 5 through 7. Therefore, achieving this certification, and thus the start of revenue flow to the DBFOM concessionaire, serves as a strong incentive for the punch-list to be closed out expeditiously and satisfactorily. It is standard practice, for similar DBFOM contracts internationally, for the final certification to be carried out by an independent third party mutually selected and agreed by the Project Sponsors and the DBFOM concessionaire.

The above mechanism also ensures that the Presidio's interests, particularly in relation to completion of the landscaping works, are protected.

After final acceptance when the proposed 30-year operations term begins, the DBFOM concessionaire is exposed to the long-term performance of the Project. This is achieved through deductions assessed against the availability payments according to contractually defined performance criteria and formulae that are subject to the Project Sponsor's continued oversight during the operations phase.

Chapter 5:

P3 Procurement Process

ARUP PB
joint venture

Images © PB Americas, Inc.

5.1 CREDIT ENHANCEMENT

A fundamental premise of the financing structure, assumed in the analysis, is that both the senior bank debt and the TIFIA debt[30] can achieve investment grade credit rating. This is likely to require the following:

- A risk allocation that follows U.S. precedents
- That the credit of the payment counter-party to the concessionaire be enhanced to achieve a stronger rating than California state general obligations
- That the lenders and equity investors' interests in mitigating the project risks are aligned with those of the Project Sponsors. The lenders will undertake detailed due diligence to ensure that the concession agreement risks are allocated to enforceable SPV construction, maintenance, operations, and other contracts.

The Californian General Obligation Bond ratings are BAA by Fitch Ratings, Baa1 by Moody's Investor Service, and A by Standard and Poor's. These are lower than in states with active road P3 programs, such as Florida and Texas, where P3 projects also rely on specific credit enhancement.

The credit standing of the concession agreement can be enhanced at the State and Project Sponsor levels.

State-level credit enhancements include the following:

- Confirmation of the legal authority to enter into the concession agreement
- Continuous appropriations for payments to be made under the agreement
- Covenant in the budget so that the state can make payments without appropriations

Continuous appropriations would remove the need for future appropriations to make payments under the concession agreement. In California, a Budget Change Proposal has been proposed in the FY2010/11 State Budget Act. In addition to the direct credit enhancement this would provide, approval by the legislature would in itself be viewed positively by the bidders and the commercial banks.

As an example of how continuous appropriations can enhance the credit of a project, Florida P3 legislation effectively provides payment priority for availability payments for P3 procurements.

Project Sponsor credit enhancements include the following:

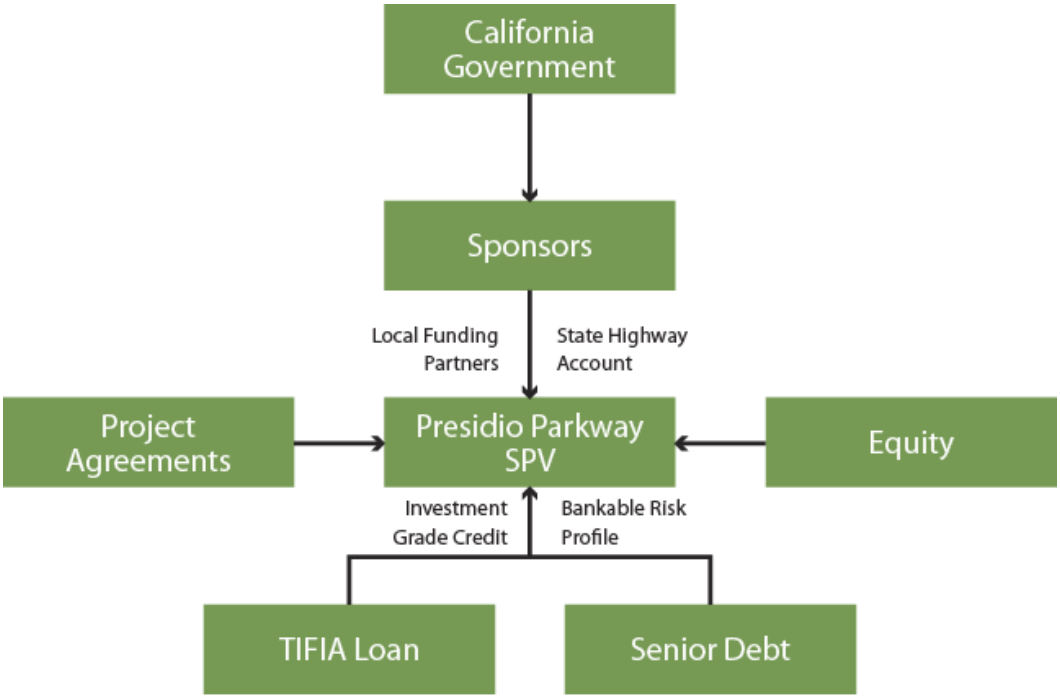
- Credit support from local funding partners, such as guarantees and letters of credit
- The deposit of federal aid transportation funds into the State Highway Account (SHA)
- Provisions in the concession agreement relating to payment priority by the funding partners in order to mitigate appropriations risk

For one example, the City of Miami backed its contribution to the Port of Miami Tunnel Project with a letter of credit. Regarding the deposit of federal aid transportation funds are deposited in the SHA, Grant Anticipated Revenue Vehicle (GARVEE) bonds are serviced by this account. They are rated AA- by Fitch Ratings, Aa3 by Moody's Investor Service, and AA- by Standard and Poor's, and would improve the overall credit quality of the

[30] TIFIA debt requires an investment grade rating if it larger than the senior commercial debt as is assumed in the DBFOM option base case.

Project. Finally, there are precedents for Texas and Florida P3 and California lease agreements that have a covenant to budget and appropriate funds for the purpose of making payments that could be applied to the Project without legislation.

Exhibit 56: Credit Enhancement for the DBFOM Option



Note: Similar multiple levels of credit enhancements would be required for a DBF.
Source: Arup

5.2 PROCUREMENT SCHEDULE

5.2.1 Procurement Schedule Considerations

The procurement schedule for a possible DBF or DBFOM option requires the satisfaction of certain conditions—such as obtaining California Transportation Commission (CTC) project approval, enhancing credit, and finalizing agreements among the funding partners —and must take into consideration the typical timelines required for a successful procurement process.

The satisfaction of the DBF or DBFOM option conditions requires political consensus reflected in the expected agreements among the funding partners. If the political consensus exists and the conditions are satisfied, this in turn will strengthen the market's perception of the potential success of a DBF or DBFOM procurement process. Conversely, if the conditions cannot be satisfied in a timeline that supports a procurement process and that can fit within the constraints of the overall construction schedule, then a DBF and DBFOM option procurement becomes challenging, potentially reducing competition and thus value for money.

5.2.2 Procurement Schedule

This section of this report discusses the Key Project Milestones under the current procurement and delivery schedules versus those set forth in the FHWA Initial Financial Plan of May 2009 and also considers the implications of the schedule on the Project Sponsors for each of the three delivery options. This section also discusses how each procurement option relates to the Project's procurement objectives.

A decision to cease development of the detailed Plans, Specifications, and Estimates (PS&E) for Contracts 5 through 8 through a traditional DBB approach was made at the end of June 2009 while assessment of possible P3 procurement was initiated. The schedule requirements for each procurement option to meet key project milestones are as follows.

P3 option key dates:

- The RFP for a P3 procurement should be released no later than the 3rd Quarter of 2010, preferably earlier
- Commercial close should be targeted towards the end of 2010
- Financial Close should be targeted for the summer or fall of 2011 (i.e., near the time when the site becomes fully available on completion of the works under Contracts 3 and/or 4)

DBB option key dates:

- Recommence the PS&E process for the design of Contracts 5 through 8 no later than mid-2010
- Begin award of Contracts 5 through 8 by the fall to the end of 2011
- Award of contractors for Contracts 5 through 8 at the end of 2011 which should coincide with access to the site.

5.2.3 Procurement Schedule Drivers

The procurement schedule is, in general terms, underpinned by the following three related, parallel activities. Although there are a number of decision drivers—such as policy considerations and timing considerations with respect to government cycles—these three major aspects are externalities that constrain the procurement schedule.

- **Key conditions for a P3 procurement**
  - CTC project approval,
  - Reimbursement agreements among funding partners,
  - Availability payment credit capacity and quality.
- **Contract 1 through 4 construction schedule (Site Availability)**: the construction contractors for the work under these contracts are either already on site (Contracts 1 through 3) or will be on site in the coming months (Contract 4). Due to the specific construction staging of this Project, the work in Contracts 5 through 8 cannot commence on site until Contracts 1 to 4 are complete and the contractors have demobilized.
- **P3 procurement process for Contracts 5 through 8**: sufficient time must be allowed for the P3 procurement process to accommodate:
  - Public sector decision processes,
  - Adequate time for bidders to form teams, analyze the Project and procurement documentation, and develop a proposal,
  - Bidders and their equity and debt providers to structure the financing and the contracts, and undertake sufficient due diligence,
  - The parties to successfully reach financial close.

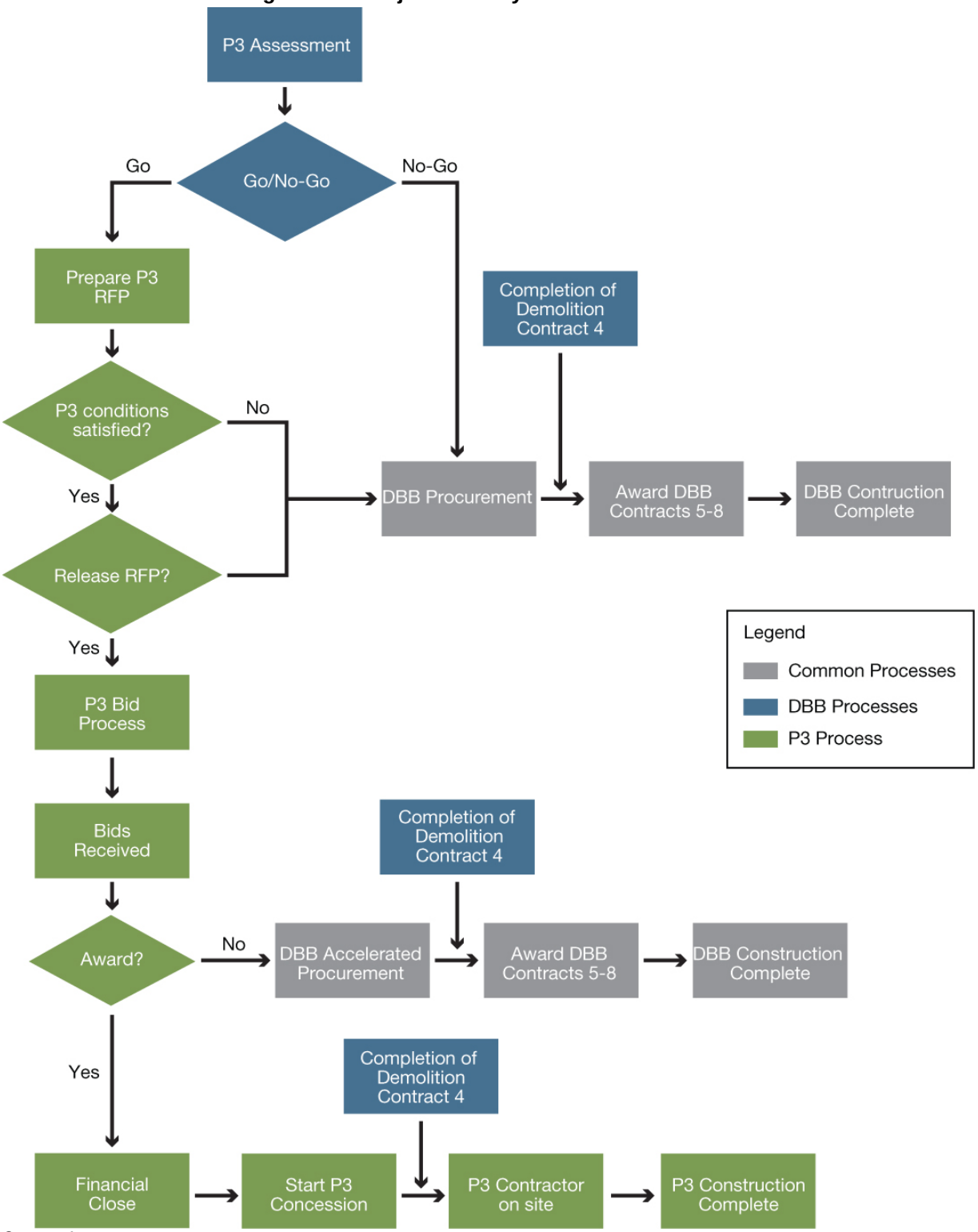
5.2.4 P3 Procurement Process

The possible P3 procurement process for either a DBF or DBFOM option can be summarized into three main tasks:

- Prepare RFQ/RFP, obtain approvals (CTC, Project Sponsors, funding partner agreements, etc.), and submit TIFIA/PAB application
- Bidding process (from release of RFP to selection of winning bidder)
- Commercial Close, Contract Execution, and Financial Close

For a DBFOM and DBF option, the tasks are very similar, but some tasks could be slightly shortened for a DBF option. Exhibit 57 illustrates this process.

Exhibit 57: Illustrative Stages in P3 Project Delivery



Source: Arup

5.2.5 Key Project Milestones

The key milestones that most influence assessing which procurement methodology is most appropriate for achieving the Project's objectives are:

- Commencement of P3 procurement – for the work previously planned to be performed under Contracts 5 through 8,
- Recommencement of DBB procurement – Contracts 5 through 8,
- Site Availability – completion of Contracts 3 and/or 4,
- Substantial Completion – Contracts 5 through 7,
- Final Completion and Commissioning/Facility Acceptance – Contract 8.

Site Availability is the critical milestone for any of the possible procurement methodologies, since it represents the time at which the site will be made available for construction contractors. The time at which the site becomes available is controlled by

- Completion of Contract 3,
- Completion of Contract 4, which includes
  - Seismic safety (traffic is transferred from the existing facility to the temporary bypass),
  - Demolition of the existing low viaduct,
  - Testing and commissioning of the integrated tunnel systems,
  - Demobilization of contractors from the site.

Therefore, the Site Availability milestone is the pivot point around which Substantial and Final Completion of the Project relies.

The work in Contract 4, expected to start on site in the spring of 2010, currently contains the critical path and controlling durations for achieving Site Availability.

5.2.6 FHWA Initial Financial Plan – Schedule Milestones and Construction Durations

The construction schedule, as set out in the FHWA Initial Financial Plan of May 2009, assumes that construction for Contract 5 would commence in October 2010, and for Contracts 6 and 7 it would commence in December 2010.

The FHWA Initial Financial Plan of May 2009 set forth the assumed Contract Milestones and Construction Durations. The relevant dates for this assessment are listed in Exhibit 58.

Exhibit 58: FHWA – Assumed Contract Milestones and Construction Contract Durations

Contract	Advertisement	Award	Begin Construction	End Construction	Construction Duration
3	Aug-2009	Oct-2009	Oct-2009	Feb-2011	16 months
4	Oct-2009	Dec-2009	Dec-2009	Feb-2011	14 months
5	May-2010	Oct-2010	Oct-2010	Dec-2012	26 months
6	Jul-2010	Dec-2010	Dec-2010	Dec-2012	24 months
7	Jul-2010	Dec-2010	Dec-2010	Dec-2012	24 months
8	Mar-2012	Aug-2012	Aug-2012	Jun-2013	10 months

Source: FHWA Initial Financial Plan of May 2009

Actual events have occurred subsequent to the FHWA Initial Financial Plan that will delay the achievement of overall delivery milestones and the durations of construction. Exhibit 59 summarizes the comparison.

Exhibit 59: Comparison of Contract Milestones and Construction Durations

	Advertisement		Begin Construction		End Construction	
Contract	FHWA	Actual	FHWA	Actual	FHWA	Actual
3	Aug-2009	Aug-2009	Oct-2009	Dec-2009	Feb-2011	TBD
4	Oct-2009	Dec-2009	Dec-2009	TBD	Feb-2011	TBD

Source: FHWA Initial Financial Plan of May 2009

Contract 3 has already experienced a two-month delay to the Begin Construction Date. At the time of publication of this report, the Advertisement Date for Contract 4 has been delayed by two months. In addition, it is likely that Contract 4 will have an overall duration from the Advertisement Date to the Begin Construction Date of four months rather than the two months originally envisaged in the FHWA Initial Financial Plan. The delay for Contract 4 will be similar to the delay on Contract 3.

As a result, the Begin Construction Date for Contract 4 is likely to be April 2010 or four months later than what was envisaged in the FHWA Initial Financial Plan. This will likely add at least a similar delay to the completion of these contracts.

Since Contract 4 controls Site Availability milestone, there is currently at least a four month delay without having yet taken into consideration the risk in the overall duration of construction as envisaged in the FHWA Initial Financial Plan.

Subsequent to the FHWA Initial Financial Plan, the design team developed detailed Plans and Specifications and performed detailed analysis through constructability and construction scheduling workshops of the Working Day Schedule for Contract 4. This was done to determine the most likely schedule duration, which is likely be greater than the construction duration originally envisaged in the FHWA Initial Financial Plan.

In addition, the transfer of additional scope of work to Contract 4 (demolition of the existing low viaduct and introduction of specifications for testing and commissioning of the integrated tunnel systems after traffic), lengthens its overall duration.

As a consequence of the above factors, the current expected completion of Contract 4, and therefore achievement of the Site Availability milestone, is later than was expected at the time of the FHWA Initial Financial Plan.

5.2.7 Implications for a DBB Procurement

Given the above, the likely date that the site will be made available for DBB contractors under any procurement methodology for Contracts 5 through 8 is the latter half of 2011, which offers greater flexibility and more achievable timelines to the Project Sponsors when considering whether to select and implement a DBB or P3 procurement.

The Project Sponsors are very experienced in DBB procurement. An 18-month period from this time to completion of Contracts 1 to 4 to proceed with a DBB procurement for Contracts 5 to 8 is historically sufficient.

5.2.8 Implications for a P3 Procurement

A well-executed DBF or DBFOM procurement can typically take between 18 and 24 months from initial consideration to Financial Close, but can run for longer depending on the project-specific requirements (typically a DBF procurement timeline can be slightly shorter than a DBFOM procurement timeline).

A realistic procurement schedule under a P3 option is needed to obtain approvals, to prepare a robust and complete RFP with supporting documentation, and to allow sufficient time for bidders to prepare technical and financial proposals.

An aggressive timeline may not be well-received among prospective bidders. At least some bidders will not be willing to take the associated risks of delivery to the aggressive timeline. This may reduce the competitive field, therefore reducing the chance for the Project Sponsors to extract maximum value from the procurement process.

The Project Sponsors will need to adopt a workable procurement strategy with a defined approval process. The more that program elements can be firmed up before the procurement process begins, the more interest the market will show, and more potential bidders could be willing produce competitive responses with lower stipends or no stipends.

To achieve a successful P3, through either a DBF or DBFOM option, the Project Sponsors must have a high degree of confidence about the substantial completion dates for Contracts 3 and 4 (i.e., the date for achievement of Site Availability); more so than they would with a DBB approach. The Site Availability Date can be more easily adjusted for DBB in response to delays that manifest during construction of Contracts 3 and 4, and adjusting the Site Availability Date would have lesser financial consequences for the Project Sponsors.

The implications of the Site Availability milestone should be considered in the structuring and timing of a possible P3 procurement:

- The time between Financial Close and the Site Availability Date should be sufficient (a) to minimize any residual risk at Financial Close of a delay in Site Availability that could impact the P3 contractor's start of work, and (b) to allow the P3 contractor to use that time to complete design work.
- The impact that delay in the Site Availability might have on the the P3 contractor's start of work must be clearly stipulated in the P3 contract provisions. In other words, the length of delay that would constitute a relief event must be explicit in the P3 contract.

Exhibit 60 gives a summary of schedule risks for a P3 procurement option.

Exhibit 60: P3 Procurement Schedule Risks

Issue	Risks/opportunities for P3 options
Agreements among funding partners	To avoid an overall delay to the process, these agreements should be finalized before or during the RFP process
Credit rating enhancement	If the credit rating enhancement is not sufficient to result in an investment-grade rating of the loans, the cost of the P3 financing would be higher, and thus would increase the NPV in the value for money assessment Continuous appropriation is unlikely to be confirmed prior to 10 July 2010. Bidders could be preparing proposals under uncertainty of its resolution, thereby either reducing market interest or increasing the need for appropriate stipends to mitigate that risk.
Credit market conditions	Although our assessment is based on current market conditions, the recent closing of the Port of Miami Tunnel project is an indication of an improving market. A worsening credit market prior to financial close is unlikely but would increase the cost of debt and equity.

Source: Arup/PB

To best manage these issues in the context of a possible P3 procurement, the Project Sponsors should consider making realistic and relatively conservative forecast dates for completion of Contracts 3 and 4. They should also consider planning a date for Financial Close that is before the forecast dates for completion of Contracts 3 and 4 but that is not too far ahead of it. This should be determined through the bidder consultation process.

Bidders will be judging the likelihood that a real transaction will actually occur and will be handicapping their odds of winning it.

5.2.9 Value for Money Assessment

At the appropriate time during a P3 procurement process, the Project Sponsors could compare the P3 procurement bids with the DBB option, to demonstrate whether the procurement will result in value for money, as projected by this report. The DBB would be updated at that point to reflect project risks, then-current market conditions, and schedule implications from that point onward.

Should the analysis not favor the P3 procurement at that point, the Project Sponsors may decide not to award the P3 contract. The Project Sponsors would also have to evaluate, at such point in time, any schedule delays for the overall completion of the Project as part of this decision.

5.3 CTC AND PIAC

Pursuant to SB4, the Department, in cooperation with regional transportation agencies (RTAs), may solicit and enter into P3 agreements with public or private entities. The P3 procurement options authorized under SB4 require additional approvals at the State level. Proposed projects must be submitted to CTC for review and approval based on CTC guidelines.

At least 60 days prior to executing a final lease agreement, the Department or the RTA must submit the P3 agreement to the State Legislature and the Public Infrastructure Advisory Committee (PIAC) for review and comment. Prior to submitting a P3 agreement to the Legislature and PIAC, either the Department or the RTA must hold at least one public hearing at or near the proposed facility for purposes of receiving public comment. The public comments must be submitted to the Legislature and PIAC along with the P3 agreement. The Secretary of Business, Transportation, and Housing and the Chairpersons of the Senate or Assembly Fiscal or Transportation Committees may provide additional comments within the 60-day period prior to the execution of the P3 agreement.

Because the legislation was passed in February 2009, the P3 program in California is still in its early stages. The roles of the CTC and the PIAC in relation to the Project should be clearly understood in the procurement process. This will be important to mitigate any concerns in the market over uncertainties related to review and/or approval rights.

The CTC guidelines for P3 projects have been adopted at this point and provide instructions on the requirements for consideration of the Project by the CTC prior to the release of the final RFP. The guidelines provide that the draft Concession Agreement should be submitted to the CTC with the application for consideration of the Project for CTC approval to proceed with a P3 delivery option.

5.4 PROJECT MANAGEMENT

Careful planning should be exercised and international best practices should be adopted when the structure and responsibilities of the Project's public sector oversight team are established. One important reason is that potential bidders will be scrutinizing the oversight to factor the value of the associated perceived risk into their decisions whether to bid.

5.4.1 DBFOM Oversight Team

Project management and oversight under a DBFOM procurement is materially different from a traditional DBB procurement. This is evident most crucially during the pre-commencement and Design-Build phases of the Project

when the risks associated with delivery are greater. The DBF option represents an intermediate or hybrid condition.

Prospective P3 bidders will expect the Project Sponsors to produce a set of performance specifications that will be acceptable to P3 concessionaires and will be drafted in a way to be relevant over the 35 year concession term while giving sufficient certainty to allow the concessionaire to price their bid.

With a DBFOM, the Project Sponsors are buying services—the design, building, financing, operation, and maintenance of the Project—subject to well-defined performance criteria. Therefore, the Project Sponsors are expected to have a limited role in reviewing and concurring on design plans and specifications before elements are released for construction, since the onus to meet the Project's performance criteria rests with the concessionaire who passes down that responsibility to the design-build contractor. As such, the Project Sponsor's review process is streamlined to simply allow for their assessment whether the design meets or is reasonably likely to meet the performance criteria. This limited review process is governed by strict timelines for returning comments or for concurrence.

In this context, it is critical to establish an appropriate oversight team representing the Project Sponsors, specifically tailored to a P3 process, that is able to delegate many of its traditional responsibilities to the P3 contractor (e.g., quality control and quality assurance are typically carried out by the P3 contractor, with independent audits carried out by the oversight team).

Of critical importance the oversight team should be empowered to make key decisions in a timely manner. The oversight team should have clear guidelines that are based on international best practices for delivering DBFOM projects. The ultimate success of delivering the design-build portion of a DBFOM project often relies on the ability of the oversight team to adapt to a role that is different from the owner's traditional role in DBB procurement.

5.4.2 DBF Oversight Team

In the case of a DBF procurement, while the responsibility to complete the design is also passed down to the design-build contractor, fundamentally the Project Sponsors are buying an asset much in the same way that they do under a traditional DBB procurement. This is in marked contrast to the DBFOM procurement, where the Project Sponsors are buying services.

In practical terms, for the DBF procurement this means that the Project Sponsors retain a significant role in reviewing and approving payment applications, inspecting the works during construction, carrying out Quality Assurance and Quality Control (QAQC), approving design packages and design changes during construction, and in accepting the work at the end of construction. The DBF contractor is, for all practical purposes, released from the Project at the end of construction, and the Project Sponsors then assume responsibility for the asset. Therefore, the Project Sponsors have strong incentives to conduct extensive and intrusive oversight during construction. On one hand, this is clearly in the interest of the public given the relatively short-term nature of the DBF contractor's involvement and the non-recourse nature of the Project Sponsors' payments to the financiers. On the other hand, the Project Sponsors retain many of the risks associated with the project delivery, much in the same way as they would in the traditional DBB procurement.

The experience in Florida with so-called gap financing projects—which have been either DBF, or in some cases just Build-Finance—amply demonstrates the above points.

As an example of a successful oversight approach, the Alameda Corridor Project provides a good benchmark. This $2.4 billion DB intermodal rail project in Southern California was a documented success in delivering a mega-project on-time and within budget. The project employed a similar methodology for its oversight team that involved numerous partners.

5.4.3 Relationship with Stakeholders

This Project is further nuanced with the number of third-party partners, i.e., multiple funding agencies, the federal government, which owns the land, and other key agencies. The oversight team should also include representatives from the key Project partners, who should also be empowered with clear responsibilities and guidelines. The goal is to ensure timely decision-making capacity of the oversight team as whole.

The oversight team should include senior representatives with relevant skills who are specifically empowered by their respective organizations to make decisions on the organizations' behalf. The agencies that should be represented include, but are not limited to: the Department, Authority, MTC, GGBHTD, and Presidio Trust.

The Presidio Trust is a key stakeholder in the Project under any of the procurement alternatives. As the land owner and steward of the Presidio as a National Park, the Presidio Trust has a keen interest in the success of the Project.

An agreement with the Presidio Trust, GGBHTD, and other stakeholders that is acceptable to all parties, including potential P3 concessionaires, should be finalized before procurement can begin. This agreement should contain right of entry and cooperative agreements that clearly define the ground rules for issues such as:

- Site access and laydown areas,
- Working hours,
- Mandatory traffic requirements on Presidio Parkway and Presidio local roads for special events in the Presidio,
- Environmental management and mitigation requirements,
- Baseline requirements for design features,
- Procedures for coordination among the parties.

The Presidio's ongoing role during construction and operation must be negotiated and agreed such that roles, communication channels, and protocols for managing the process, including dispute resolution, are clearly defined.

The Project Sponsors must consider the risk allocation with respect to the impact on the Project's construction schedule and cost as a consequence of failure to act promptly during construction by each of the parties.

5.5 PUBLIC SECTOR SCOPE CHANGES

Any changes in the scope of the Project must be considered and managed carefully to minimize cost and schedule impacts, regardless of the procurement option considered. In the case of a DBF or a DBFOM procurement, the procedures and consequences of any such changes are typically identified in the P3 contract. As such, it is important that those procedures are clearly defined so that the change processes, if needed in the future, are well-known in advance by both parties to the contract.

The UK HM Treasury[31] and UK National Audit Office[32] independently concluded that when the cost to the public sector increased on P3 projects, the increases were not due to project cost overruns but were always the consequence of the public sector altering the requirements and the private sector increasing prices to reflect those changes.

It is common practice for P3 contracts in North America and elsewhere to entitle the DBFOM concessionaire to time and cost compensation for public sector–initiated scope changes. In general terms, examples of such

[31] HM Treasury, PFI: Meeting the investment challenge, July 2003
[32] National Audit Office, PFI: Construction performance, 2003

possible future scope changes include lane widening, addition of ramps or interchanges, seismic retrofitting due to changes in design standards, and changes in O&M standards.

Given the nature of the Project and its setting within the Presidio, in addition to the high degree of definition in the environmental documents and the current (relatively high) level of design completion, major changes to the Project's features—such lane widening or the addition of interchanges or ramps—are extremely unlikely. Other issues, such as seismic retrofits or changes in O&M standards, are possible.

The Project Sponsors should be aware that implementing these types of changes will normally involve compensation and would take time to negotiate and implement. Any such scope changes requested by local stakeholders, the Presidio Trust or the GGBHTD, would have to be made to the Project Sponsors, who may then decide to open discussion and negotiation with the DBFOM concessionaire for the changes to be implemented. The stakeholders would then have to agree on a cost sharing arrangements to pay for the changes.

During the operations phase of a project, on the other hand, it is common practice in the United States for P3 contracts to make the concessionaire responsible for upgrading highway safety features and systems (barriers, attenuators, etc.) to the extent that those upgrades are required to adhere to state or federal standards which are being implemented elsewhere in the highway system in the state. If the changes are not being applied in a discriminatory way, then the concessionaire is responsible for paying for them. This feature protects the public sector from the risk of future costs associated with (non-discriminatory) safety upgrades to the facility. In the case of California, this concessionaire responsibility would not extend to seismic upgrades which we have assumed would continue to be a shared responsibility as is currently the case from examples across the state.

Appendices

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Appendix A:

Key Dates

A1 Key Dates

Assumption	DBB	DBFOM
Project Milestones		
Analysis period / concession duration from contract award	33 years	33 years
Construction duration	33 months	33 months
Commercial close	N/A	Sep-10
Availability payment amortization / contract payment start date	N/A	Jul-13
First semi-annual P3 availability payment	N/A	Jul-13
Final payment of 30-year availability payment or contract payment	N/A	Jul-13
TIFIA	N/A	No later than Jul 10
Contract award*		
Contract 5	Oct-10	N/A
Contract 6	Dec-10	N/A
Contract 7	Dec-10	N/A
Contract 8	Aug-12	N/A
Construction start*		
Contract 5	Feb-11	Feb-11**
Contract 6	Feb-11	Feb-11**
Contract 7	Feb-11	Feb-11**
Contract 8	Aug-12	Feb-11**
Completion*		
Contract 5	Dec-12	Dec-12
Contract 6	Dec-12	Dec-12
Contract 7	Dec-12	Dec-12
Contract 8	Jun-13	Jun-13
Milestone payment date	N/A	Dec-12
Availability payment start date	N/A	Jul-13

* FHWA Initial Financial Plan, May 12, 2009.

Source: Arup/PB

Appendix B:

Construction Costs

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B1 Baseline Construction Costs (2009$)

From the FHWA Initial Finance Plan (May 2009), the breakdown of the baseline construction and support costs are shown for Contracts 1 to 8, respectively.

Contracts	Description	Capital Cost [a]	R/W Support Cost [b]	R/W Capital Cost	Design Support Cost [b]	Design & Construction Support Cost [b]	Total Support Cost [b]	Total Capital & Support Cost
Contract 1	Advanced Environmental Mitigation (wetland, biological, tree removal). Mitigation prior to construction activities. Environmental mitigation during construction is accounted for in the individual contract budgets.	$3,574,580	$1,000,000	--	$5,000,000	$1,000,000	$7,000,000	
Contract 2	Utility Relocation Prior to Construction Activity, including private utility relocation for items owned by the Presidio (public utility relocations are included in the R/W data sheet).	$14,700,000	$500,000	--	$2,700,000	$2,000,000	$5,200,000	
Contract 3	Ruckman, Southern PPI, SB High Viaduct.	$120,030,000	$1,000,000	$10,000,000	$9,300,000	$16,000,000	$26,300,000	
Contract 4	SB battery tunnel, At-Grade Detour, RW #6, Permanent Roadway Sections, Long Weekend Closure, Partial Demo of Low Viaduct Structures & Open At-Grade Detour to Public Traffic.	$97,770,000	$1,500,000	$23,000,000	$7,700,000	$14,500,000	$23,700,000	
Contract 5	Girard UC, Main Post tunnels, Low Viaduct, includes Fill Over Tunnels, Electrical and Mechanical Substations, Demo existing Low Viaduct, Maintain and Remove At-Grade Detour, Open Permanent Roadway to Public Traffic.	$263,880,000	--	--	$18,100,000	$22,000,000	$40,100,000	
Contract 6	NB Battery Tunnels and related roadwork, includes fills over tunnels, conform to existing viaduct.	$63,650,000	--	--	$5,200,000	$8,000,000	$13,200,000	
Contract 7	NB Viaduct, Northern Park Presidio Interchange, NB Roadway to Merchant Road.	$89,190,000	--	--	$8,100,000	$9,500,000	$17,600,000	
Contract 8	Highway Planting.	$7,600,000	--	--	$900,000	$1,900,000	$2,800,000	
Total Capital Cost Contracts 1 to 8		$660,394,580	$4,000,000	$33,000,000	$57,000,000	$74,900,000	$135,900,000	$829,294,580
Total Capital Cost Contracts 5 through 8		$424,320,000	--	--	$32,300,000	$41,400,000	$73,700,000	$498,020,000

(a) FHWA Initial Financial Plan, May 12, 2009, Figure 2-3 p14.

(b) FHWA Initial Financial Plan, May 12, 2009, Figure 2-7, 2-8 p18.

Index to table: ROW: Right of Way, PPI: Park Presidio Interchange, SB: South Bound, UC: Under Crossing, NB: North Bound

Source: Arup/PB

B2 Project Construction Cost Assumptions

In order to develop a schedule of construction cost draw downs, further assumptions and adjustments to the FHWA Initial Financial Plan baseline cost estimates have been made:

- The Underground Parking Garage previously in Contract 5 was removed from the scope, as it is now part of a separate agreement with the Presidio to mitigate lost parking spaces ($14.1 million).
- The bridge demolition previously in Contract 5 was removed from the scope, as it is now part of Contract 4 ($22.8 million).

Construction cost schedule of expenditure per Arup/PB JV assumed an industry-standard S-curve.

Under DBB and DBFOM, construction cost escalation was assumed to be 3 percent per annum (per FHWA Initial Financial Plan).

Construction costs under the DBB and DBFOM respectively were subjected to risk assessment and Monte Carlo simulation to assess risk of cost overrun. Results are presented in Section 4, and domestic and international benchmarks for cost overrun (optimism bias) are shown in Appendix E.

Under the DBFOM option O&M scenario, additional costs were incurred for vehicles and small equipment (larger pieces of equipment being leased or rented).

Total sunk costs expended to date on Design Support for Contracts 5 through 8 were estimated at $12.5 million.

Environmental support costs totaling an estimated $25.6 million were not included in the total construction costs, as they would likely fall outside of the 3-year look-back period for TIFIA debt sizing purposes.

B3 Construction Cost Adjustments

Cost Adjustment (2009$)	Comments
Cost increases	
Design management	This item is not required in the DBF and DBFOM options because the Department is not involved.
Home office management	This item is not required in a DBFOM as responsibility has been transferred to the private sector. The Department will have some involvement in the DBF options.
Quality control	This item is not required in the DBFOM option, as responsibility has been transferred to the private sector and is accounted for elsewhere.
Presidio Trust – design support	The same for all options.
Presidio Trust – construction support	The same for all options.
Consultant engineering	The difference in this item represents the an emphasis on upfront spend in engineering design for the DBF and DBFOM options where costs savings are expected to be recuperated during construction and operations.
Department oversight	This item represents limited Department expenditure as a result of limited inputs.
Contractor QAQC (DBF & DBFOM options only)	This item is required as an addition, as the Department will take on new responsibliites for oversight in a DBF or DBFOM.
Roadway (DBF & DBFOM options only)	Higher spend to effect optimized maintenance scenarios. The additional costs are due to increased construction costs to achieve longevity of life cycle (e.g., thicker pavements, increased drainage, higher quality materials by prescriptive specification, etc.)
Cost Efficiencies	
Design	This item is not required in the DBFOM option, as responsibility has been transferred to the private sector and is accounted for elsewhere.
Construction management	This item is not required in the DBFOM option, as responsibility has been transferred to the private sector and is accounted for elsewhere.
Demolition	This item represents an incremental improvement in costs due to refinement of approach and procedures under a Design-Build team collaboration. This combines contracts, thus saving mobilization and cost efficiencies by working on both demolition areas together under one contract.
Structures	This item represents rigorous application of design engineering to optimize facilities through the Design-Build collaboration.
Tunnels	This item represents rigorous application of design engineering to optimize facilities through the Design-Build collaboration.
TRO & Mobilization	This item represents an incremental improvement in costs from refinement of approach and procedures through the Design-Build team collaboration.
Planned supplemental work	Savings due to fewer allowances.
Construction reserve	This item is applied as the same percentage to all cases.
Total cost adjustment	

Source: Arup/PB

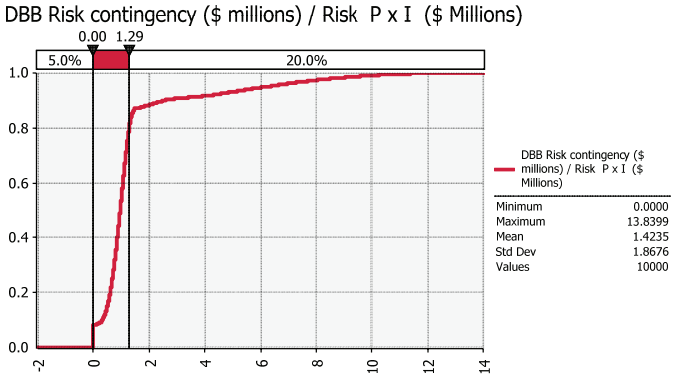
B4 Construction Risk Analysis Results

The following output graphs show the results of the risk analysis conducted for the project delivery options. The analysis segregated between the risks retained by the Project Sponsors and the risks passed down to the P3 contractor. For each case, the risk analysis (Monte Carlo Simulation) is based on the project-specific risk register shown in Section 3 of this report, with probabilities and cost of risks adjusted for each delivery option.

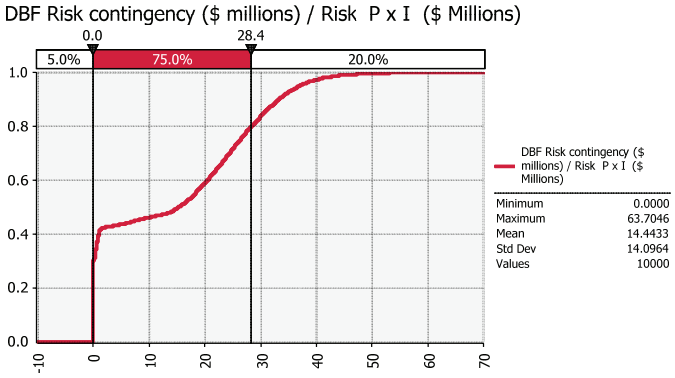
The total risk adjustment for each delivery option, as shown in Exhibit 27 of this report, is the sum of the private and public risks. The outputs are taken at the 80th percentile confidence interval, meaning, that with an 80 percent probability the actual project risks will not exceed the estimated dollar amount indicated by the analysis (conversely, there is a 20 percent probability that the actual project risks will exceed the estimated dollar amount).

B4.1 Construction Risk Priced by Contractor

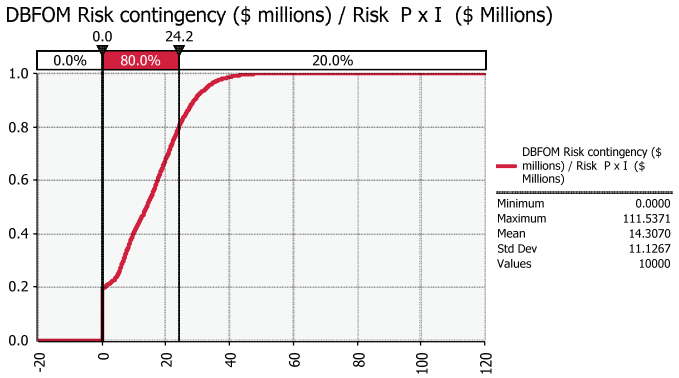
B4.1.1 DBB Option: contractor risk estimate = $1 million



B4.1.2 DBF Option: contractor risk estimate = $28 million

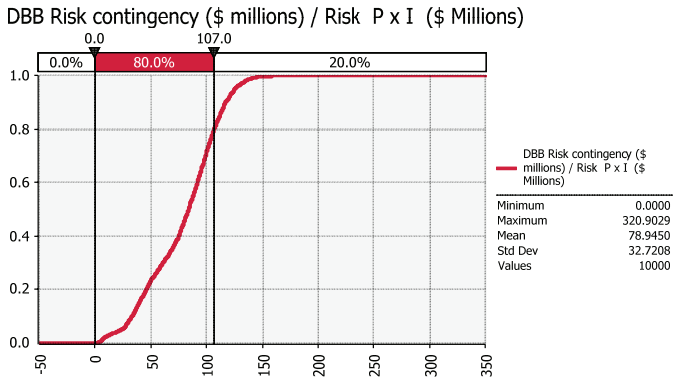


B4.1.3 DBFOM Option: contractor risk estimate = $24 million

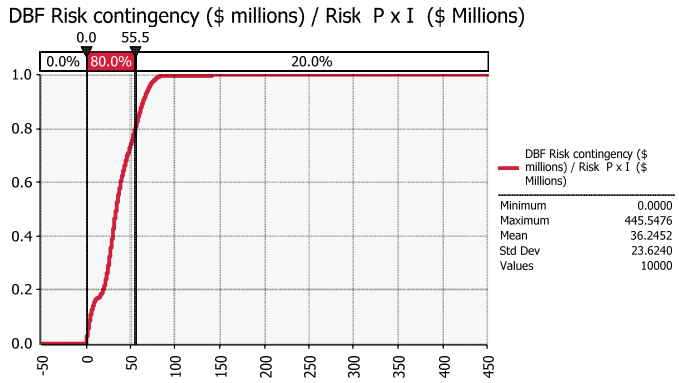


B4.2 Construction Risk Retained by Project Sponsors

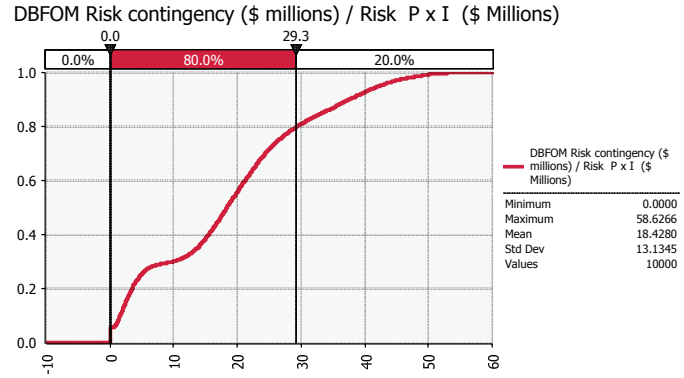
B4.2.1 DBB Option: retained risk estimate = $107 million



B4.2.2 DBF Option: retained risk estimate = $56 million



B4.2.3 DBFOM Option: retained risk estimate = $30 million



Source: Arup/PB

Appendix C:

Explanatory Notes for Expected Construction Costs at Completion

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C1 Explanatory Notes for Expected Construction Costs at Completion

Explanatory notes on the costs breakdown for both the DBB and DBFOM cases are shown below:

FHWA Base Cost:

- Baseline costs from the FHWA Initial Financial Plan, May 2009.

Scope Adjustment: Removal of work scope from the FHWA Initial Financial Plan

- Parking structure from Contract 5.
- Structure demolition from Contract 5.

Cost Adjustments: Gap analysis and efficiencies applied to baseline costs:
DBB case accounts for additional costs for:

- Management
- Engineering
- Quality Control
- Presidio Trust - Design and Construction Support

DBFOM case accounts for additional costs for:

- Presidio Trust - Design and Construction Support
- Efficiencies: Reduction in hard and soft costs achieved through DBFOM procurement as detailed in Section 3.3

Expended Design: Removed already expended design costs for Contracts 5 through 8.

Public Costs: For the DBFOM, removed the Public Sector cost for oversight and construction reserve.

Adjusted Base Cost: Net baseline cost incorporating adjustments to the FHWA Initial Financial Plan for scope, cost, efficiencies, expended design, and public costs.

Design Contingencies: Soft cost and design growth contingency.

Construction Risk Priced by the Contractor: A project-specific risk assessment (80 percent confidence) developed by an experienced contractor & technical team with a wealth of engineering and contractor experience to determine a contingency level appropriate for this Project. This is the risk transferred to the contractor /concessionaire and includes a “risk Premium” in the bid price.

Private Transaction Costs: Costs of advisors and management for procuring the DBFOM

Contractor’s Bid Price: The adjusted base case plus design contingency, construction risk, and private transactions costs. This is the cost financed by the P3 concessionaire / DBF contractor.

Public Transaction Costs: Public Sector costs for producing the business case, RFQ and RFP documents, performance specifications, concession agreement, legal fees, stipends, managing the procurement process, and oversight.

Retained Risk Reserve: The portion of the project-specific risk analysis that is retained by the Project Sponsors to pay for cost overruns.

Cost at Completion: Total expected cost at completion for DBFOM (both Private and Public Sectors costs) and DBB.

C2 Rationalization of Cost Efficiencies

In comparing the costs of the DBF and the DBFOM options with the conventional DBB project delivery method, it is necessary to capture the likely construction costs to be borne by the design-build Contractor. The analysis must then consider the means and methods the Contractor may use, and the efficiencies or inefficiencies that may be realized as part of their endeavor. As shown by various academic, industry, and governmental studies done internationally and domestically, construction costs savings are usually created and can be anticipated under a design-build delivery scenario. Features that are inherent to this delivery method include design and construction integration, minimized project duration, use of higher quality materials, and increased efficiency and productivity for the involved design consultants and contractor team. Specifically for this Project, consideration was also given to project specific risks, constraints, and the current project status when applying any efficiency factors.

From a high level, the rationalization of reduced or increased cost began with the FHWA Initial Financial Plan baseline cost estimate. Construction costs are adjusted to match with current scope, then segregated and appraised for their likelihood to increase or decrease based on project knowledge and experiences of construction professionals. This efficiency appraisal for major construction cost items against the baseline are as follows.

	DBF vs. DBB	DBFOM vs. DBB
Demolition	10% Savings	10% Savings
Roadway	2.5% Increase	5% Increase
Structures	5% Savings	10% Savings
Tunnels	5% Savings	10% Savings
TRO & Mobilization	50% Savings	50% Savings

Source: Arup/PB

The savings in demolition, structures, and tunnels work are attributed to integration of design and construction as well as general increased efficiencies achieved by the design consultants and contractor team. The savings in TRO and mobilization are realized from disincentives for schedule delays and integrated working relationship between the designer and contractor. The increase in roadway costs is due to the use of higher quality materials for the roadway by the design-build team for improving serviceability and minimizing operation and maintenance costs. In other words, this minimizes the whole life cost of the facility.

Academic, industry and governmental research have also reached similar conclusions for efficiency savings that are realized by design-builders in these types of project delivery methods. A study by FHWA done in 2006 finds that design-build projects typically shows significant advantage over design-bid-build projects in shortening project durations by 14% and reducing project costs by 3%, which are attributed to the integration of design and construction teams.[*] Florida Department of Transportation[†] and the University of Pennsylvania[‡] independently compiled similar studies with similar findings on the effectiveness of design-build delivery on costs and schedule.

Knowledgeable members of the current Arup/PB design team and experienced construction professionals participated in the above mentioned analysis. The researched efficiencies are reviewed in conjunction with project specific constraints and knowledge, leading to estimated efficiencies that in line with industry trends while being project sensitive.

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[*] Design-Build Effectiveness Study, FHWA, January 2006
[†] Design Build Program, Florida Department of Transportation
[‡] Konchar, Mark D. “A Comparison of United States Project Delivery Systems,” Pennsylvania State University. Pennsylvania, 1997

Caltrans

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

Appendix D:

Indicative Responsibility Allocation Matrix

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D1 Indicative Responsibility Allocation Matrix

Category	Description	DBB	DBF	DBFOM
Government Sponsor				
Adequacy of its overall size to meet public service needs	Risk that the project does not meet the public service needs, e.g., number of lanes to meet traffic demand	Public	Public	Public
Change in public sector requirements in the future (Change Orders)	Risk that the Public Sector makes changes to the requirements of the asset, e.g., an additional ramp	Public	Public	Public
Standards of delivery set by the public sector meet public needs	Risk that the asset performance standards do not meet the public needs, e.g., level of service requirements for user safety and ride quality	Public	Public	Public
Extent to which the facility is used	Risk that the asset is used more than the Public Sector assumption	Public	Public	Private
CPI Inflation (O&M)	Risk that the inflation forecast moves outside the assumption range causing higher than anticipated costs	Public	Public	Public
Procurement timescales, costs & award of appropriate party	Risk that the procurement is not delivered on time or within the budget requirements, or that the party selected to undertake the work is not the most appropriate	Public	Public	Public
Project affordability	Risk that the Public Sector cannot afford the project or does not obtain value for money	Public	Public	Public
Program Management				
PM Oversight	Risk that the appropriate level of oversight and guidance is not achieved and that decisions are not made in a timely manner	Public	Public	Public
Interface				
Contracts 1&2/3&4/5-7 (schedule, O&M)	Risk that () interface contracts are later than anticipated, thus causing construction costs to increase and/or causing construction delays or (b) the appropriate level of asset quality is not achieved for the long-term Operation and Maintenance of the asset, thus resulting in higher costs than anticipated	Public	Public	Shared
Golden Gate	Risk of the requirements, timely decision making, and constraints imposed on the project by project partners	Public	Shared	Shared
Presidio	Risk of the requirements, timely decision making, and constraints imposed on the project by project partners	Public	Shared	Shared
Other agencies	Risk of the requirements, timely decision making, and constraints imposed on the project by project partners	Public	Shared	Shared
Public engagement	Risk of the requirements, timely decision making, and constraints imposed on the project by the Public sector	Public	Shared	Shared
Site Risk				
Right of Way	Risk that the appropriate project requirements are not addressed so as to enable the project to be delivered as agreed	Public	Public	Public
Geotechnical	Risk that the geotechnical conditions vary from those assumed which cause	Public	Private	Private

Category	Description	DBB	DBF	DBFOM
	construction costs to increase and/or cause construction delays			
Archaeological	Risk of archaeological discoveries that cause construction cost increases or construction delays	Public	Public	Public
Hazardous Materials	Risk of hazardous materials being uncovered that vary from those assumed, thus causing construction cost increases or construction delays	Public	Public	Public
Permits & approvals	Risk that necessary approvals are not obtained or are obtained only subject to unanticipated conditions which have adverse cost consequences or cause prolonged delays	Public	Shared	Shared
Design & Construction				
Design plans & specification	Risk that the design of the facility is incapable of delivering the services at the anticipated cost or that there are errors or omissions	Public	Public*	Private
Technical obsolescence or innovation	Risk that (a) the design and its method of delivery do not keep pace, from a technological perspective, with public requirements or (b) the design life of the facility proves to be shorter than anticipated, thus accelerating refurbishment expense	Public	Public*	Private
Construction methodology	Risk that events occur during construction that prevent the facility from being delivered on time and within budget	Private	Private	Private
Design continuity	Risk that the design of the facility is incapable of delivering the services at the anticipated cost across all contacts	Public	Public*	Private
Warranties and defects (Contracts 5-8)	Risk that design or construction quality is inadequate, thus resulting in poor asset performance, e.g., the maintenance and refurbishment costs are higher than anticipated	Private	Private	Private
Cost overrun risk during construction	Risk that the actual project costs are higher than anticipated or budgeted	Shared	Shared	Private
Timely completion of the facility	Risk that the construction schedule is longer than anticipated	Shared	Private	Private
Labor Disputes	Risk of strike, industrial action, or civil commotion that causes delay and increased cost to the project	Private	Private	Private
Construction contractor failure	Risk that a contractor may fail financially or may fail to provide contracted services to specification	Public	Public	Private
Quality	Risk that the asset does not meet the quality requirements because of poor workmanship, thus requiring replacement, which increases construction costs , causes construction delays, or lowers the level of service	Shared	Shared	Private
Weather	Risk that weather impacts are worse than anticipated, thus causing a delay or increased cost to the project	Private	Private	Private

Category	Description	DBB	DBF	DBFOM
O&M				
Higher rehabilitation and replacement costs	Risk that the design or construction quality is inadequate, resulting in poor asset performance and thus higher than anticipated maintenance and refurbishment costs	Public	Public	Private
R&R and O&M cost escalation after financial close	Risk that inflation moves forecast outside the assumption range, thus resulting in higher than anticipated costs	Public	Public	Private
Changes in output specification outside agreed specification range	Risk that the Public Sector output requirements are changed after contract signing (either pre- or post-commissioning)	Public	Public	Public
Level of service	Risk that Public Sector Level of Service requirements are changed or that some of the performance of the asset does not meet the requirements	Public	Public	Private
Operator failure (failure of subcontractors)	Risk that a contractor may fail financially or may fail to provide contracted services to specification	Public	Public	Private
Labor disputes	Risk that a strike, industrial action, or civil commotion delays or increases cost to the project	Public	Public	Private
Asset ownership				
Private party is unable to provide the required services	Risk that the procurement does not select an appropriate private party to undertake the work	Public	Public	Public
Technical obsolescence/design life	Risk that (a) the design and its method of delivery do not keep pace, from a technological perspective, with public requirements or (b) the design life of the facility proves to be shorter than anticipated, thus accelerating refurbishment expense	Public	Public	Private
Default and termination	Risk of "loss" of the facility or other assets caused by the premature termination of the agreement, thus leading the project financier to find a replacement to enable delivery	Public	Public	Private
Default leading to step-in by financier	Risk of "loss" of the facility or other assets caused by the premature termination of the agreement, thus leading the project financier to find a replacement to enable delivery	Public	Private	Private
Force majeure				
Seismic	Risk that contracted service delivery (pre- or post- completion) is not met because of a seismic event	Public	Public	Shared

Category	Description	DBB	DBF	DBFOM
Legislative and government policy				
Political stability	Risk that political instability causes poorly defined requirements or poor decision making, impacting the cost of the program	Public	Public	Public
Political approval process	Risk that additional any approval that is required during the course of the project is not obtained in a timely fashion	Public	Public	Public
Discriminatory change in law/policy of the State Government	Risk that a change in law or in the policy of the state government, which could not be anticipated at contract signing and which is directed specifically and exclusively at the project or services, has adverse consequences for the capital expenditures or operating costs of the private party	Public	Public	Public
Discriminatory change in law/policy (at whatever level of government it occurs)	As above, applicable to all levels	Public	Public	Shared
Changes in required maintenance practices or standards	Risk that O&M requirements change, thus resulting in higher than anticipated costs	Public	Public	Private
Changes in tax legislation	Risk that the tax requirements change, thus resulting in higher than anticipated costs	Private	Private	Private
Financing				
Debt sizing and financing costs	Risk that the market changes, resulting in higher than anticipated costs	Public	Private	Private
Refinancing risk	Risk that the market changes, resulting in higher than anticipated costs at the refinancing stage	Public	Public	Private
Credit quality	Risk that the appropriate credit quality is not achieved, thus resulting in higher than anticipated costs or in threats to the delivery of the project.	Public	Private	Private

* This is atypical for DBF but occurs because of the high level of design development for Phase II that has already been achieved and because of site-specific design constraints from matching existing designs for compatibility with Phase I.

Source: Arup/PB

Appendix E:

Optimism Bias

E1 Optimism Bias

There is ample evidence in the literature of cost overrun in traditional public works procurement, although comprehensive statistical analyses are rare and difficult to compile. The table below summarizes the results of the Team's risk analysis conducted specifically for the Project. Cost overrun results were calculated by the Team, based on a Department-provided database, along with domestic and international data from the literature showing the systematic tendency to under-estimate final costs in large-scale road projects (also known as "optimism bias").

Assumption	Average	Standard Deviation	50th Percentile	80th Percentile	Notes/ Source
Project-specific risk analysis (DBB option only)	N/A	N/A	N/A	29%	Project-specific risk assessment at 80% confidence developed by an experienced technician and contractor team through Monte Carlo simulation. Figure is based on FHWA estimate including contingency versus the estimated budgeted cost.
Department contracts above $50 million	3%	30%	(5%)	18%	Department database for 83 construction contracts with budgeted costs above $50m in 2009$. Figures are based on the Department's Engineer's Estimate including Contingency and Supplemental Work versus the Final Total Cost.
Department contracts above $100 million	25%	61%	10%	39%	Department database for 26 construction contracts with budgeted costs above $100m in 2009$. Figures are based on the Department's Engineer's Estimate including Contingency and Supplemental Work versus the Final Total Cost.
Department contracts above $300 million	76%	70%	N/A	N/A	Department database for 5 construction contracts with budgeted costs above $300m in 2009$. Figures are based on the Department's Engineer's Estimate including Contingency and Supplemental Work versus the Final Total Cost.
Bent Flyvbjerg Database	N/A	N/A	15%	32%	Bent Flyvbjerg with COWI for The UK Department for Transport Procedures for Dealing with Optimism Bias in Transport Planning, June 2004. The figures are based on budget estimates versus Project Capital Expenditures (cost overrun).
U.S. Government Accountability Office	41%	45%	32%	55%	Government Accountability Office / Resources, Community & Economic Development Division (GAO/RCED-97-47), "Managing costs of Highway Projects," February 1997. Figures are based on estimate versus Final Total Cost.
UK HM Treasury VfM Guidelines (UK Green Book)	N/A	N/A	6*	66*	HM Treasury / Mott McDonald "Review of Large Public Procurement (UK Green Book)," July 2002. Figures are based on Risk Assessment of project cost estimates.*

* These figures do not represent a percentile range but rather upper and lower bound figures.
Source: Arup/PB

Appendix F:

Operation and Maintenance Assumptions

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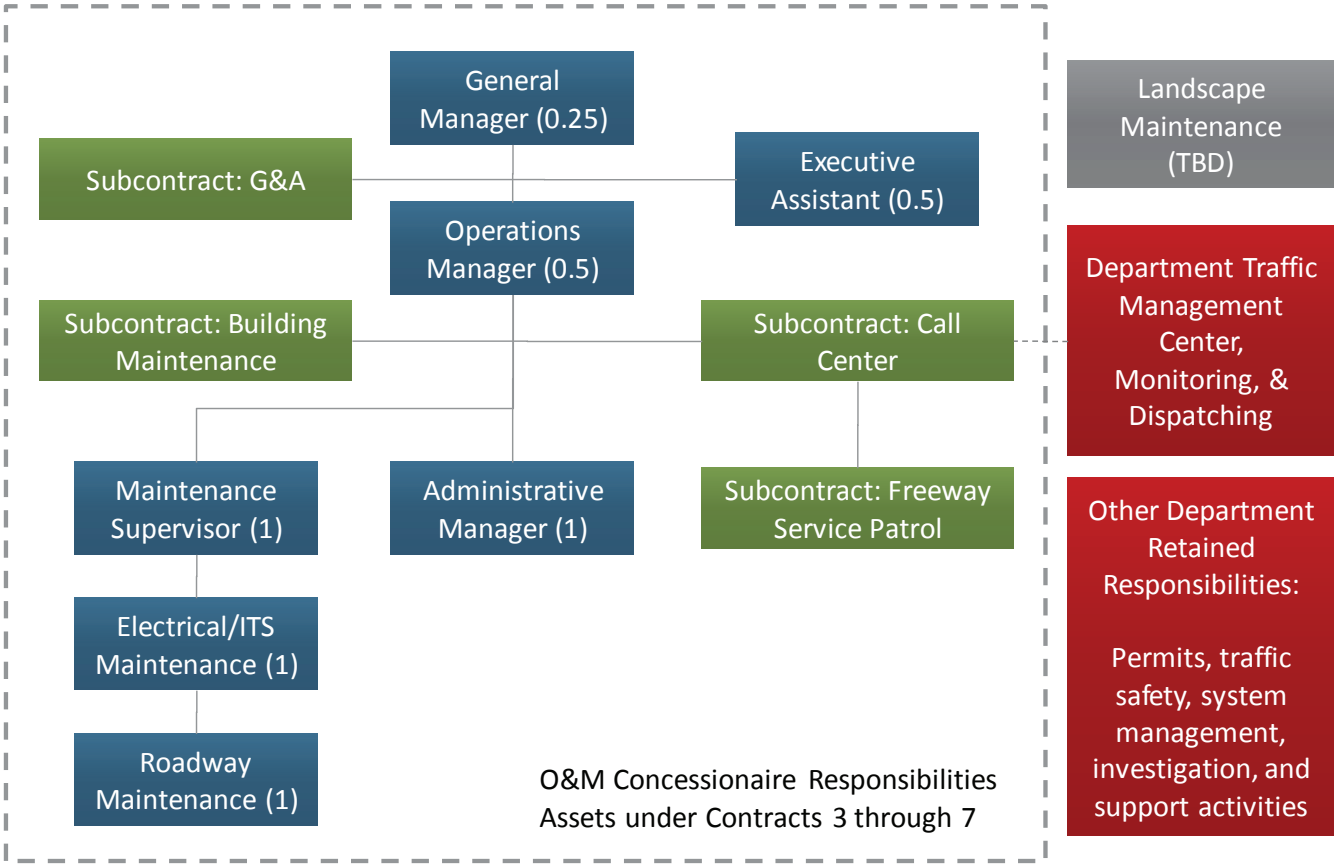
F1 O&M Organizational Chart – DBFOM Option



Source: PB

F2 Primary Operating Cost Assumptions

Element	Public Sector Operation	Private Sector Operation
Executive Staff and Administrative Costs	Overhead multiple of 1.8x assumed on maintenance staffing costs to account for Department executive, administrative and operational costs Executive and administrative staffing included in total annual overhead costs of approximately $377,000 per year beginning in 2013	Executive staff assumed to be part-time and split resources amongst multiple facilities Annual operational staffing cost of approximately $334,000 per year for 1.25 FTE employees beginning in 2013
Salaries & Benefits	Staffing costs provided by the Department	Based on local prevailing wages
ODCs	Costs associated with contracted and outsourced activities such as policing, insurance, freeway service patrol and utilities assumed to be the same in both cases and excluded from analysis Other ODCs such as office equipment, consulting & legal fees, recruiting, etc. accounted for in overhead multiplier No costs for ITS operations associated with the Traffic Management Center	Costs associated with contracted and outsourced activities such as policing, insurance, freeway service patrol and utilities assumed to be the same in both cases and excluded from analysis Annual budget line items for all other ODCs that would be incurred by DBFOM concessionaire Traffic Management Center responsibilities for ITS operations assumed to be outside of concession scope and undertaken by the Department due to economies of scale
Total Operating Costs	Total annual budget of approximately $377,000 starting 2013 Present value of annual operating budget equal to $320,000 at 5.5%	Total annual budget of approximately $833,000 starting 2013 Present value of annual operating budget equal to $710,000 at 5.5% Higher operating budget relative to public sector case due to economies of scale that are lost with a small-scale, stand-alone operation

Note: All monetary values in 2009$
Source: PB

F3 Primary Routine Maintenance and Rehabilitation Cost Assumptions

Element	Public Sector Maintenance	Private Sector Maintenance
Scope Summary	Highway Signs and Traffic Control Devices, Pavement Striping and Delineation, Sweeping, Removal of all Debris and Objects, Drainage, Pavement, Landscape of the Median, Guard Rail, Safety Devices, Bridge Rail, Tunnels and Tunnel Equipment, Pumping Plants, Electric and Mechanical Substations, Lighting, Structures, Substructures and Superstructures, Graffiti Removal	
Routine Maintenance	Annual maintenance budget fiscally constrained at $468,000 per year (in 2009$), double the State-wide per lane mile average Priority given to activities addressing fire, life and safety issues such as tunnel and Information and Technology Systems (ITS) maintenance, HAZMAT, and repair of guardrail, barriers, potholes, etc. Very limited budget remaining for preventive maintenance needs of pavements, tunnel, bridge and retaining wall structures, drainage facilities, fencing, lighting, and other smaller items Annual maintenance budget beginning in 2013 is equivalent to approximately $400,000 in present value terms at 5.5%	Routine maintenance program fully funded at $685,000 per year (in 2009$) to allow for required activities as well as all preventive maintenance tasks necessary to maximize the life of roadway assets Priority given to activities addressing fire, life and safety issues such as tunnel and ITS maintenance, HAZMAT, and repair of guardrail, barriers, potholes, etc. Sufficient budget remaining to allow for comprehensive maintenance program that includes preventive work such as joint sealing, surface patching, drainage cleaning, structure repairs, etc. Annual maintenance budget beginning in 2013 is equivalent to approximately $585,000 in present value terms at 5.5%
Major Rehabilitation	Total rehabilitation cost of $97 million (in 2009$) over the 60-year operating period Pavement rehabilitation cycles accelerated due to lack of preventive maintenance and anticipated around years 30 and 40 at a total cost of $59 million (in 2009$) Other rehabilitation cycles for tunnel and ITS work assumed comparable to private sector case since most maintenance activities are addressed in routine maintenance program Present value of 60-year rehabilitation budget approximately $27 million at 5.5%	Optimized rehabilitation cost of $87 million (in 2009$) over the 60-year operating period as a result of preventive maintenance program Concrete pavement rehabilitations anticipated around years 40 and 60 All other assets assumed to achieve full useful lives Present value of 60-year rehabilitation budget approximately $17 million at 5.5%

Source: PB

F4 Primary Operating Cost Assumptions

Cost Item	Operations/ Maintenance	Description	Public Sector Operations	Private Sector Operations
STAFFING				
Salaries & Headcounts	Operations Maintenance	FTE requirements and annual salaries for all staff positions	Maintenance staff allocated based on budget constraints and required fire, life and safety maintenance activities Administrative and operations staffing costs included in overhead multiplier applied to maintenance staff costs Salary figures for maintenance staff provided by the Department	Assume executive staff is part-time and managing other facilities in addition to Doyle Drive (thus only a portion of their staffing costs is allocated to the Project) Salaries above local prevailing wages
Benefits	Operations Maintenance	Benefits costs estimated as a percentage of salaries	Benefits figures provided by the Department	Percentage of base salaries
Bonuses & Overtime	Operations Maintenance	Annual merit bonuses due to private sector operation (includes planned overtime compensation for non-bonus pool employees)	No bonuses or overtime assumed	Level of bonus will depend on position Tiered bonus pool for top executives and staff Staff not typically receiving bonuses are expected to receive some overtime pay
ROADWAY MAINTENANCE (EXCLUDES LABOR AND EQUIPMENT)				
Bridge & Structure Maintenance	Maintenance	General maintenance and cleaning of bridge structures, including slope protection, crack filling, joint cleaning, etc.	515,000 square feet of bridges Minimal maintenance performed only to address life and safety issues; no preventive maintenance	515,000 square feet of bridges Both life and safety maintenance as well as preventive and other maintenance
Crack & Joint Sealing	Maintenance	Repairing minor cracks and joint seals in pavement	13 lane miles of mainline and ramps Minimal maintenance performed only to address life and safety issues; no preventive maintenance	13 lane miles of mainline and ramps Both life and safety maintenance as well as preventive and other maintenance
Routine Patching	Maintenance	Patching of potholes and other small routine pavement repairs	13 lane miles of mainline and ramps Minimal maintenance performed only to address life and safety issues; no preventive maintenance	13 lane miles of mainline and ramps Both life and safety maintenance as well as preventive and other maintenance

Cost Item	Operations/ Maintenance	Description	Public Sector Operations	Private Sector Operations
Pavement Markings	Maintenance	Restriping the lanes on the roadway and replacing reflectors and post-mounted delineators	272,249 linear feet of line striping 4,094 reflectors 10 delineators Minimal maintenance performed only to address life and safety issues; no preventive maintenance	272,249 linear feet of line striping 4,094 reflectors 10 delineators Both life and safety maintenance as well as preventive and other maintenance
Roadway Sweeping	Maintenance	Sweeping of shoulders to remove litter and debris	No costs beyond labor and equipment Dumping fees included in debris removal cost 13 miles of mainline and ramp shoulders to sweep Minimal maintenance performed only to address life and safety issues; no preventive maintenance	No costs beyond labor and equipment Dumping fees included in debris removal cost 13 miles of mainline and ramp shoulders to sweep Both life and safety maintenance as well as preventive and other maintenance
Debris Removal	Maintenance	Clearing roadway of debris (tires, dead animals, etc.)	7 mile centerline length Minimal maintenance performed only to address life and safety issues; no preventive maintenance	7 mile centerline length Both life and safety maintenance as well as preventive and other maintenance
Guardrail & Barriers	Maintenance	Repair of guardrail and barriers, attenuators	41,800 linear ft of guardrail 13,200 linear ft of concrete barrier 10 attenuators assumed on facility Minimal maintenance performed only to address life and safety issues; no preventive maintenance	41,800 linear ft of guardrail 13,200 linear ft of concrete barrier 10 attenuators assumed on facility Both life and safety maintenance as well as preventive and other maintenance
Fencing	Maintenance	Limited-access fencing as required at edge of ROW	26,100 linear ft of fencing Minimal maintenance performed only to address life and safety issues; no preventive maintenance	26,100 linear ft of fencing Both life and safety maintenance as well as preventive and other maintenance
Tunnel Maintenance	Maintenance	Maintenance of tunnel and tunnel components such as ventilation, electrical, mechanical, emergency power, and fire suppression systems	3,400 ft. of tunnels Tunnel maintenance costs assumed to be required, non-deferrable activities	3,400 ft. of tunnels Tunnel maintenance costs assumed to be required, non-deferrable activities

Cost Item	Operations/ Maintenance	Description	Public Sector Operations	Private Sector Operations
Signage Maintenance	Maintenance	Roadway sign cleaning, addressing wind and weather damaged overhead and post signs, replacing guide signs and posts after accidents on both mainline & frontage roads	5,000 square feet of overhead signage 200 regulatory signs 200 sign posts Minimal maintenance performed only to address life and safety issues; no preventive maintenance	5,000 square feet of overhead signage 200 regulatory signs 200 sign posts Both life and safety maintenance as well as preventive and other maintenance
Lighting	Maintenance	Replacing bulbs, sockets, ballasts, light heads, etc. on low level and high mast roadway lighting	200 lights / lamp heads Includes lighting in tunnels which is assumed to be a required, non-deferrable activity	200 lights / lamp heads Both life and safety maintenance as well as preventive and other maintenance
Traffic Signals	Maintenance	Repairing traffic signals and controllers	3 traffic lights Minimal maintenance performed only to address life and safety issues; no preventive maintenance	3 traffic lights Both life and safety maintenance as well as preventive and other maintenance
Drainage Maintenance	Maintenance	Clearing debris and vegetation to maintain proper drainage	45,000 linear ft of culverts 5,500 linear ft of ditches 300 catch basins 150 curb inlets/outlets Minimal maintenance performed only to address life and safety issues; no preventive maintenance	45,000 linear ft of culverts 5,500 linear ft of ditches 300 catch basins 150 curb inlets/outlets Both life and safety maintenance as well as preventive and other maintenance
HAZMAT Removal	Maintenance	Cleanup of HAZMAT (oil, fuel, antifreeze, etc.) on roadway and in maintenance shop / administrative building areas	All HAZMAT issues assumed to be required, non-deferrable activities	All HAZMAT issues assumed to be required, non-deferrable activities
On-Call Services	Maintenance	Subcontracting of cyclic and routinely scheduled maintenance services such as sweeping, drainage cleaning, guardrail/barrier repair, etc.	Minimal maintenance performed only to address life and safety issues; no preventive maintenance	Line item budgeted for in maintenance program
LANDSCAPING & AESTHETICS (EXCLUDES LABOR AND EQUIPMENT)				
Litter Removal	Maintenance	Picking up all trash within the right-of-way. Costs for consumables such as trash bags.	7 centerline miles Minimal maintenance performed only to address life and safety issues; no preventive maintenance	7 centerline miles Both life and safety maintenance as well as preventive and other maintenance

Cost Item	Operations/ Maintenance	Description	Public Sector Operations	Private Sector Operations
Mowing	Maintenance	Mowing all grass within ROW	0.6 acres of mowable area in centerline median Minimal maintenance performed only to address life and safety issues; no preventive maintenance	0.6 acres of mowable area in centerline median Both life and safety maintenance as well as preventive and other maintenance
Weeding / Seeding / Sodding	Maintenance	Repairing areas where grass has died and perform herbicide treatment and removing weeds for grassy and plantation areas	Assumed to be excluded from Department maintenance responsibility	Assumed to be excluded from concession scope
Mulching	Maintenance	Mulching for trees, shrubs, plantings, and around buildings and rest areas	Assumed to be excluded from Department maintenance responsibility	Assumed to be excluded from concession scope
Tree & Shrub Replacement	Maintenance	Replacement of damaged and dead plantings	Assumed to be excluded from Department maintenance responsibility	Assumed to be excluded from concession scope
Painting & Graffiti Removal	Maintenance	Repainting of painted surfaces and cleaning graffiti from retaining walls, underpasses, etc. (excluding structural steel)	Assumed to be excluded from Department maintenance responsibility	Assumed to be excluded from concession scope
FACILITIES MAINTENANCE & OPERATIONS				
Document Storage & Waste Disposal	Operations	Trash pickup from buildings (excluding roadway debris & litter removal from roadway and adjacent ROW) and document storage/shredding expense	Costs included in overhead multiplier applied to maintenance staff costs	Line item budgeted in facility maintenance costs
Janitorial Services	Maintenance	General janitorial services at administration / operations center building provided 5 days per week (cleaning supplies not included in contract price)	2,000 square feet for O&M facility Costs included in overhead multiplier applied to maintenance staff costs	2,000 square feet for O&M facility Line item budgeted in facility maintenance costs
HVAC	Maintenance	Routine contract with outside firm for maintenance on HVAC units in Maintenance building	2 HVAC systems Costs included in overhead multiplier applied to maintenance staff costs	2 HVAC systems Line item budgeted in facility maintenance costs

Cost Item	Operations/ Maintenance	Description	Public Sector Operations	Private Sector Operations
Security Monitoring	Operations	Routine contract with outside firm for security alarm system for O&M facility	Costs included in overhead multiplier applied to maintenance staff costs	Line item budgeted in facility maintenance costs
Pest Control	Operations	Monthly service of facility buildings	Costs included in overhead multiplier applied to maintenance staff costs	Line item budgeted in facility maintenance costs
VEHICLE & EQUIPMENT OPERATIONS & MAINTENANCE				
Administrative Vehicles	Operations	Expenses relating to administrative vehicle fleet for operations staff (excludes maintenance vehicles and equipment) including vehicle lease payments, fuel, maintenance, and insurance	Costs included in overhead multiplier applied to maintenance staff costs	Line item budgeted in vehicle & equipment O&M
Maintenance Vehicle Lease	Maintenance	Expenses relating to power-driven maintenance vehicles that are procured through an annual lease rather than purchased as capital equipment	Part-time usage of Department vehicles & equipment assumed based on life and safety maintenance activities performed	Line item budgeted in vehicle & equipment O&M
Maintenance Vehicle Maintenance	Maintenance	Expenses relating to maintenance fleet including fuel, oil changes, replacement parts, inspections, etc.	Part-time usage of Department vehicles & equipment assumed based on life and safety maintenance activities performed	Line item budgeted in vehicle & equipment O&M

Source: PB

Appendix G:

Discount Rate

ARUP PB

G1 Discount Rate

INTRODUCTION

To compare the costs of traditional public sector based procurement relative to P3 alternatives, a comparison of projections of future cash flows under each of the delivery options has been undertaken. The future cash flows are "normalized" to have a "like-for-like" comparison by discounting them to a common base date. Therefore, the value of the discount rate is an important input for the Value for Money (VfM) analysis.

BACKGROUND

There has been considerable discussion in the P3 field about what the appropriate Discount Rate should be, which risks it should reflect and there is no international consensus on the subject. Different procurement agencies in different jurisdictions take different approaches. Some countries, such as the U.K., use a single discount rate which is applied to all types of projects across the public sector; other governments, such as British Columbia, Canada, apply project specific discount rates; and others, such as Australia, advocate that two different discount rates, one for the public sector comparator base case and another for the P3 options, may be appropriate to reflect differences in systematic risk allocations between the public and private sectors.[36]

In California there is not, as of this writing, a standardized methodology for determination of the discount rate in the context of VfM for comparing traditional public sector based procurement relative to P3 alternatives. Whereas we expect that a standardized methodology will be adopted, to complete the analysis in this report an assumption had to be made.

GOVERNMENT COST OF BORROWING

It is generally accepted that, for the P3 Public Sector Comparator VfM, the cash flows of the P3 procurement option should not be discounted at the risk-free rate,[37] defined as the government's cost of borrowing. Although the project-specific cash flows include risk adjustments for as many of the known and quantifiable project risks as possible, it is not possible to quantify all risks that affect the project.

For example, market risks—the risk of "unknown unknowns" and additional un-quantified risks that can affect the outcome of a project—cannot be included. Further, the risk analysis conducted for the project specific cash flow estimates is based on a probabilistic analysis at a confidence level less than the 100th percentile, which means that the cost estimates have residual uncertainty.[38]

Sources of residual uncertainty include construction cost risk variability from uncertain future outcomes and the fact that the analysis does not take into account the correlations among some of the risks.

Finally, there is a possibility of there being correlation among some of the risks in ways that have not been already taken into account in the analyses.

Given these factors, a more appropriate discount rate is required. At a minimum, a risk premium should be added to the government cost of borrowing that reflects the risks of the project, including project-specific risks (which are

[36] New South Wales Government. *Determination of Appropriate Discount Rates for the Evaluation of Private Financing Proposals.* Technical Paper. February 2007.
[37] Risk Free rate is the CA bond rate (A- for the taxable bond)
[38] The risk analysis results have been taken at the 80th percentile, i.e., there is a 20 percent probability that the risk adjustments could be exceed.

taken into account in the cash flows in the analysis) and market or systemic risks (which are not included in the cash flows themselves).

SELECTION OF APPROPRIATE DISCOUNT RATE

An exercise was performed to determine an appropriate discount rate and a range of alternative discount rates for sensitivity analysis and to highlight the breakeven point between the delivery options.

OVERVIEW OF EXISTING APPROACHES

The existing approaches to the discount rate applied for VfM analysis in countries considered relatively more experienced in the P3 field are considered below:

- Social Time Preference Rate – the value society places on consumption of goods and services now, for example as applied in the U.K.
- Project Specific Rate (pre-tax time-weighted WACC) –as proposed by Partnerships BC, Canada
- Differentiated Discount Rates (Public sector comparator rate vs. P3 rate) – the current Risk-free Rate (to reflect the time value of money) with a premium added toa ccount for the systematic risk, as applied in Australia

THE SOCIAL TIME PREFERENCE RATE

The 2003 U.K. "Green Book," the U.K. HM Treasury's guidance for appraisal and evaluation of government projects applicable to P3-PSC comparisons,[39] uses a "social time preference" (STP) rate, deriving from classic concepts in welfare economics fleshed out in the 1950s and 1960s. The STP rate reflects the value society places on consumption of goods and services now, compared with consumption in the future.

The Green Book STP rate is the sum of few components:

- an intertemporal preference rate
- a "catastrophe risk" rate
- a third component that takes into account the idea (roughly) that as per capita income increases, people will care less about additional income, and this increases their preference for money today relative to money in the future
- the inflation rate

In 2003 the STP real discount rate (i.e., before inflation) was revised and estimated to be 3.5 percent, which was reduced from 6 percent. This is referred to as the "recommended" discount rate, which applies to all types of projects at multiple decision points during the project phase, including for feasibility studies that evaluate the economic benefits and costs of undertaking a project investment (Investment decision). This rate is also used for the procurement decision analysis that determines the appropriate procurement process (traditional vs. P3)

In the United States the closest equivalent to the STP rate is established by the Federal government's Office of Management Budget under Circular A-94 "Guidelines and Discount Rates for Benefit-Cost Analysis of Federal Programs," published in 1992. The real discount rate applicable to evaluate the government's investment decision for projects with social benefits is 7 percent. This rate has not been changed since that time. Prior to 1992, the real discount rate was 10 percent.

In both STP rate cases noted above (U.K. and U.S.), the nominal discount rate that is required to discount nominal cash flows (i.e., cash flows that include the effect of inflation) is taken to be equal to the sum of the real

[39] HM Treasury. The Green Book, Appraisal and Evaluation in Central Government. 2003.

discount rate (U.S. 7.0%) as adjusted for the assumed annual rate of inflation (U.S. 2.2%). This would result in an estimate for the United States of 9.2%

PROJECT PRE-TAX TIME-WEIGHTED WACC

British Columbia's agency Partnerships BC, the most experienced province in Canada in the P3 field, has a standard methodology to perform P3 evaluations. These are presented in the draft document entitled "Methodology for Quantitative Procurement Options Analysis," released in August 2009, as part of its guidance documents. The document proposes a methodology to perform VfM analysis and also provides guidelines for estimating the discount rate.

Partnership BC's approach on the discount rate for VfM analysis differs substantially from the one in the U.K. because it results in the application of different discount rates to different decision points in the project phase. The first decision point, the investment decision, is when the government determines whether if should fund the construction of an infrastructure asset. The second decision point, the procurement decision, is when the government determines whether to assume the risk of holding and operating an infrastructure asset rather than having those functions taken on by the private sector.

The investment decision is evaluated using a social discount rate reflecting the opportunity cost of capital from society's viewpoint. Typically, the cost/benefit decision of whether the government should fund an infrastructure project includes the assessment of social costs (environmental and social public costs) and benefits (heath, convenience, etc.) that are not necessarily reflected in the price individuals would pay to use infrastructure.

The procurement decision is an asset portfolio management decision: whether the infrastructure asset under consideration should be included in a government's asset portfolio or owned by a private partner. According to Partnership BC's approach, the risk profile and considerations of the project are similar whether the project is delivered by the public sector or the private sector, although the cash flows may be different because of the differences in the ways the risks are managed by each. Since in the type of P3 approach considered for this Project the revenues received by the P3 concessionaire are the same as the payments made by the Project Sponsors (i.e., the P3 concessionaire has no other revenues other than the payments received from the public sector), the revenue return to the government from the P3 investment is very similar, if not exactly the same as, the revenue return to the P3 concessionaire. Based on Partnership BC's rationale, as a result of the above the government should discount costs and revenues using essentially the same cost of capital of the P3 concessionaire.

Partnership BC's methodology to establish the discount rate is based on investment portfolio theory. This approach involves basing the discount rate on the cost of capital for a particular project, expressed as the weighted average cost of capital (WACC) of the various project funding sources such as debt and equity. In order to correctly apply the WACC as the discount rate for a project, consideration needs to be given to the manner in which the capital structure and consequently, the WACC, changes over the life of the project. To accurately model the project over the term of the partnership, the pre-tax time weighted WACC is used.

The pre-tax, time-weighted WACC for the base case DBFOM option is 8.50%.

DIFFERENTIATED DISCOUNT RATES

The Council of Australia Governments endorsed the National Public Private Partnership Policy and Guidelines on 29 November 2008, which apply to all Australian, State and Territory Government agencies. Australia's methodology agrees with Partnership BC's approach that different discount rates may be appropriate to different decision points: investment fund decision versus procurement decision. While in the former the social discount rate is appropriate, in the latter case a project specific rate should be estimated.

However, the discount rate methodology for procurement analysis differs in that 1) it distinguishes between PSC and P3 discount rates, the PSC is discounted using the risk free rate, while the P3 option is discounted using the project specific rate, and 2) the framework to estimating the project specific discount rate is based on Capital Asset Pricing Model (CAPM) and not on WACC.

The Discount Rate determined by CAPM includes the current Risk-free Rate (to reflect the time value of money) and adds a premium for the systematic risk[40] of the project being analyzed. The difference compared to Partnership BC's approach is in that the Risk-free Rate is applied to the cash flows of the PSC, while the discount rate determined by CAPM, which is the Risk-free Rate plus the premium for systematic risk, is applied to the private sector cash flows in the P3 approach. As risks are being transferred from the government to the private sector, the project's inherent rate derived from the CAPM analysis increases.

The Capital Asset Pricing Model (CAPM) says $R_a = R_f + \beta_a (R_m - R_f)$

- R_a is the required return on assets whose risk class is designated by the Beta or Systematic Risk (the Project Rate)
- Rf is the Risk-free Rate and is taken to be the yield to maturity of a 10-year Commonwealth Bond
- βa is the Asset Beta, which reflects the degree that asset returns (returns of a particular project) are expected to vary with returns of the market (a well Diversified Portfolio of assets or projects)
- (Rm-Rf) is the return over the Risk-free Rate (the market risk premium or equity risk premium) that investors would need or expect in order to invest in an asset. The market risk premium in real terms is taken to be 6 percent

According to the Australian National Public Private Partnership Policy and Guidelines, the PSC cash flows should always be discounted using the risk free rate, while the discount rate for discounting the P3 cash flows should be the risk free rate plus a proportion (which can be from 0% to 100%) of the project risk premium, reflecting the proportion of the systematic risk that is transferred.

Annex 3 of the National Public Private Partnership Policy and Guidelines provides indicative Betas and project risk premiums for different infrastructure sectors, for example, as Exhibit G1 below shows, the rate of return or discount rate for a transportation project procurement decision would typically be around 8 percent.

Exhibit G1: Indicative Project Rate of Returns for Different Infrastructure Sectors – Australia

Risk Band	Project Sectors	Asset Beta	Real Risk Premium	Project Rate of Return
Very Low	Accommodation and related services	0.3	1.8	6.8
Low	Water, transport, and energy	0.5	3.0	8.0
Medium	Telecommunications, media, and technology	0.9	5.4	10.4

Note: the risk free rate was 4.95% as January 2009 based on Treasury Corporation of Victoria. The project rate of return equals the risk free rate + risk premium.
Source: National Public Private Partnership Guidelines-Volume 5 Discount Rate Methodology Guidelines.

[40] Systematic risk (also known as market or non-diversifiable risk) is the measure of the extent to which a particular project's (or asset's) returns are likely to vary relatively more (or less) than a portfolio of projects (or assets). Systematic risk cannot be eliminated by diversification through investing in other assets.

APPROACH RECOMMENDED FOR THE PRESIDIO PARKWAY DELIVERY OPTIONS ANALYSIS

BASE CASE

As previously indicated the selection of an appropriate Discount rate is not an exact science.

Based on the comparison of existing approaches in countries considered relatively more experienced in the P3 field a number of different rates were considered:

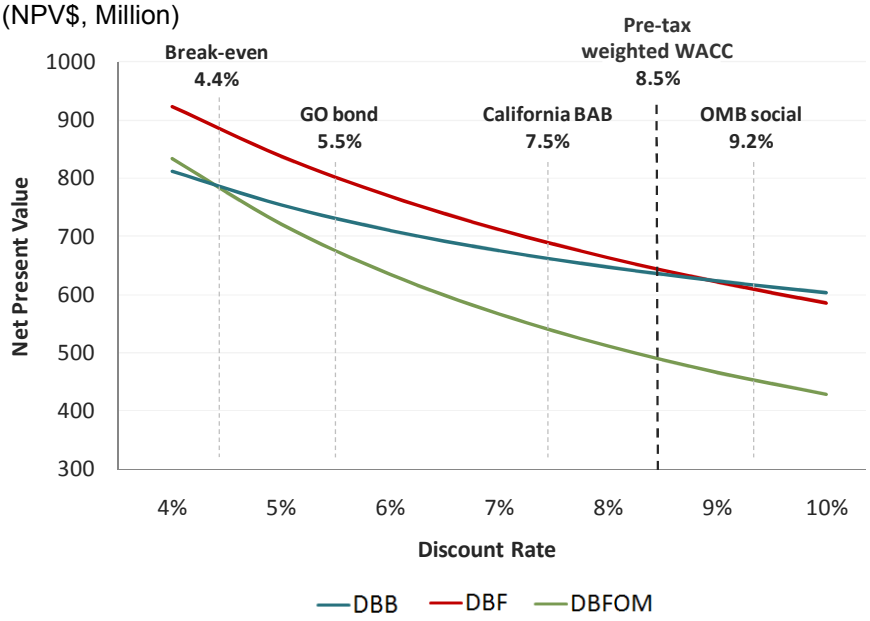
- The Social Time Preference rate adjusted for inflation – 9.20%
- The pre-tax, time-weighted WACC – 8.50%
- Differentiated discount rates – PSC – 7.40% (risk free), P3 7.40% plus an upwards risk adjustment

In relation to the base case we decided to use the pre-tax, time-weighted WACC to discount each option. In our opinion, this methodology is well-founded and logical, it is currently in use by several major procurement agencies internationally, and it is relatively straight-forward to apply in practice.

SENSITIVITY ANALYSIS

Sensitivity analyses have been performed in addition to the base case, using different rates to cover the discount rate approaches reviewed in this report. These approaches provide a numerical range to cover a reasonable range of sensitivity of the results. Exhibit G2 and the following table demonstrate the impact different discount rates have on the NPV of each option.

Exhibit G2: Sensitivity of NPV by Delivery Option to Varying Discount Rates
(NPV$, Million)



Note: California general obligation and Build America Bond rates fluctuate
Source: Arup and as per table below

Exhibit G3: Further Information on Reference Rates

Approach	Value	DBB	DBF	DBFOM	Reference	Comments
		(NPV$, Million)				
Social preference rate or social discount rate	9.2%	619	614	469	U.K. HM Treasury approach; in the US based on OMB Circular A-94 for projects with social benefits.	The OMB A-94 rate is 7% real, to which inflation assumed at 2.2% in this report is added.
Project pre-tax, time-weighted WACC (base case)	8.5%	635	642	488	Partnerships BC approach using Project pre-tax, time-weighted WACC, which is calculated from the project's audited financial model.	Approach in Australia is similar.
Risk free rate (government cost of capital rate) – taxable	7.5%	660	687	538	Based on California taxable 30 year bonds.	Taxable bond does not include the implicit subsidy represented by the foregone tax revenues that are a cost to taxpayers.
Risk free rate (government cost of capital rate) – tax exempt	5.5%	730	802	676	Based on California General Obligation 30 year bonds.	CA GO rate is a tax-exempt rate. See comments above.

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Caltrans

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

Appendix H:

Summary of Base Case Scenario

ARUP PB

H1 Summary of Base Case Scenario

Design Bid Build (DBB)

DBB Project Sponsor's Semi-Annual Cash Outflows	NPV at 8.5% as of 30-Jun-09	(YOE$, Million) Nominal
Construction Payments	369.06	457.97
Operations Costs	4.79	51.64
Rehab & Maintenance Costs	23.15	493.66
Public Sector Transactions and Contract Oversight Costs	77.03	96.26
Estimated Public Sector Retained Risk Reserve	124.52	
Tax adjustment	36.18	166.78
Total Cost, DBB	634.73	1,390.83

Design Build Finance (DBF)

	NPV at 8.5% as of 30-Jun-09	(YOE$, Million) Nominal
Sponsor Payments	324.68	639.92
Milestone Payments	112.68	150.00
Operations Costs	4.79	51.64
Rehab & Maintenance Costs	23.15	493.66
Public Sector Transactions and Construction Oversight Costs	49.51	61.11
Estimated Public Sector Retained Risk Reserve	90.58	
Tax Adjustment	36.18	166.78
Total Cost, DBF	641.57	1,653.69
Difference in NPV vs. DBB	(1.1%)	(7)

Design Build Finance Operate and Maintain (DBFOM)

Project Sponsor's Semi-Annual Cash Outflows under DBFOM with Constant Availability Payment	NPV at 8.5% as of 30-Jun-09	(YOE$, Million) Nominal
Availability Payments	290.62	1,131.07
Milestone Payments	112.68	150.00
Public Sector Transactions and Construction Oversight Costs	32.00	50.77
Estimated Public Sector Retained Risk Reserve	46.52	
Post-handback public sector O&M costs	6.61	590.68
Total Cost, DBFOM	488.43	1,969.04
Difference in NPV vs. DBB	23.0%	146

Source: Arup

H2 Semiannual Cash Flows

Start Date	1-Jan-09	1-Jul-09	1-Jan-10	1-Jul-10	1-Jan-11	1-Jul-11	1-Jan-12	1-Jul-12	1-Jan-13	1-Jul-13
End Date	30-Jun-09	31-Dec-09	30-Jun-10	31-Dec-10	30-Jun-11	31-Dec-11	30-Jun-12	31-Dec-12	30-Jun-13	31-Dec-13
Year	Year 2009	Year 2009	Year 2010	Year 2010	Year 2011	Year 2011	Year 2012	Year 2012	Year 2013	Year 2013
DBFOM										
Semi-Annual Cashflows										
Availability Payments	-	-	-	-	-	-	-	-	-	17.73
Milestone Payments	-	-	-	-	-	-	-	150.00	-	-
Public Sector Transaction & Contract Oversight Costs	-	4.09	5.17	10.97	2.38	2.41	2.44	2.46	2.08	0.22
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	-	-	-	-	-	-	-	-	-	-
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	150.00	-	-
Operations Costs	-	-	-	-	-	-	-	-	-	0.21
Rehab & Maintenance Costs	-	-	-	-	-	-	-	-	-	0.39
Public Sector Transactions & Construction Oversight Costs	-	2.04	2.58	8.04	9.81	9.92	10.03	10.14	8.54	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	-	-	-	-	-	-	-	-	-	1.05
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	11.93	86.97	169.28	134.53	48.93	6.33	-
Operations Costs	-	-	-	-	-	-	-	-	-	0.21
Rehab & Maintenance Costs	-	-	-	-	-	-	-	-	-	0.39
Public Sector Transactions & Construction Oversight Costs	-	1.02	1.03	11.10	16.84	17.02	17.21	17.39	14.65	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	-	-	-	-	-	-	-	-	-	1.05

Start Date	1-Jan-19	1-Jul-19	1-Jan-20	1-Jul-20	1-Jan-21	1-Jul-21	1-Jan-22	1-Jul-22	1-Jan-23	1-Jul-23
End Date	30-Jun-19	31-Dec-19	30-Jun-20	31-Dec-20	30-Jun-21	31-Dec-21	30-Jun-22	31-Dec-22	30-Jun-23	31-Dec-23
Year	Year 2019	Year 2019	Year 2020	Year 2020	Year 2021	Year 2021	Year 2022	Year 2022	Year 2023	Year 2023
DBFOM										
Semi-Annual Cashflows										
Availability Payments	18.00	18.13	18.12	18.16	18.15	18.28	18.22	18.36	18.30	18.44
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	0.25	0.25	0.26	0.26	0.26	0.27	0.27	0.27	0.27	0.28
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	-	-	-	-	-	-	-	-	-	-
DBF										
Semi-Annual Cashflows										
Sponsor Payments	42.55	42.79	42.67	42.67	42.55	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.26	0.26	0.26
Rehab & Maintenance Costs	0.35	0.36	0.36	0.39	0.37	0.37	0.38	3.68	0.92	0.45
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	2.07	2.14	2.16	2.20	2.22	2.30	2.31	1.47	2.20	2.39
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.24	0.24	0.24	0.24	0.25	0.25	0.25	0.26	0.26	0.26
Rehab & Maintenance Costs	0.35	0.36	0.36	0.39	0.37	0.37	0.38	3.68	0.92	0.45
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	2.07	2.14	2.16	2.20	2.22	2.30	2.31	1.47	2.20	2.39

Start Date	1-Jan-24	1-Jul-24	1-Jan-25	1-Jul-25	1-Jan-26	1-Jul-26	1-Jan-27	1-Jul-27	1-Jan-28	1-Jul-28
End Date	30-Jun-24	31-Dec-24	30-Jun-25	31-Dec-25	30-Jun-26	31-Dec-26	30-Jun-27	31-Dec-27	30-Jun-28	31-Dec-28
Year	Year 2024	Year 2024	Year 2025	Year 2025	Year 2026	Year 2026	Year 2027	Year 2027	Year 2028	Year 2028
DBFOM										
Semi-Annual Cashflows										
Availability Payments	18.43	18.47	18.46	18.60	18.54	18.68	18.62	18.77	18.76	18.80
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	0.28	0.28	0.29	0.29	0.29	0.30	0.30	0.30	0.31	0.31
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	-	-	-	-	-	-	-	-	-	-
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.26	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.29	0.29
Rehab & Maintenance Costs	0.39	0.40	0.40	0.41	0.41	0.42	0.42	1.32	0.76	0.50
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	2.46	2.52	2.54	2.62	2.64	2.72	2.73	2.48	2.69	2.84
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.26	0.27	0.27	0.27	0.28	0.28	0.28	0.28	0.29	0.29
Rehab & Maintenance Costs	0.39	0.40	0.40	0.41	0.41	0.42	0.42	1.32	0.76	0.50
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	2.46	2.52	2.54	2.62	2.64	2.72	2.73	2.48	2.69	2.84

Start Date	1-Jan-29	1-Jul-29	1-Jan-30	1-Jul-30	1-Jan-31	1-Jul-31	1-Jan-32	1-Jul-32	1-Jan-33	1-Jul-33
End Date	30-Jun-29	31-Dec-29	30-Jun-30	31-Dec-30	30-Jun-31	31-Dec-31	30-Jun-32	31-Dec-32	30-Jun-33	31-Dec-33
Year	Year 2029	Year 2029	Year 2030	Year 2030	Year 2031	Year 2031	Year 2032	Year 2032	Year 2033	Year 2033
DBFOM										
Semi-Annual Cashflows										
Availability Payments	18.79	18.94	18.88	19.03	18.97	19.13	19.12	19.17	19.16	19.32
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	0.31	0.32	0.32	0.32	0.33	0.33	0.33	0.34	0.34	0.34
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	-	-	-	-	-	-	-	-	-	-
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.29	0.30	0.30	0.30	0.31	0.31	0.31	0.32	0.32	0.32
Rehab & Maintenance Costs	0.44	0.44	0.45	0.45	0.46	0.46	0.47	13.42	1.71	0.56
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	2.93	3.03	3.06	3.15	3.18	3.28	3.32	0.55	2.72	3.40
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.29	0.30	0.30	0.30	0.31	0.31	0.31	0.32	0.32	0.32
Rehab & Maintenance Costs	0.44	0.44	0.45	0.45	0.46	0.46	0.47	13.42	1.71	0.56
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	2.93	3.03	3.06	3.15	3.18	3.28	3.32	0.55	2.72	3.40

Start Date	1-Jan-34	1-Jul-34	1-Jan-35	1-Jul-35	1-Jan-36	1-Jul-36	1-Jan-37	1-Jul-37	1-Jan-38	1-Jul-38
End Date	30-Jun-34	31-Dec-34	30-Jun-35	31-Dec-35	30-Jun-36	31-Dec-36	30-Jun-37	31-Dec-37	30-Jun-38	31-Dec-38
Year	Year 2034	Year 2034	Year 2035	Year 2035	Year 2036	Year 2036	Year 2037	Year 2037	Year 2038	Year 2038
DBFOM										
Semi-Annual Cashflows										
Availability Payments	19.26	19.42	19.36	19.52	19.52	19.57	19.57	19.73	19.67	19.84
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	0.35	0.35	0.36	0.36	0.36	0.37	0.37	0.38	0.38	0.38
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	-	-	-	-	-	-	-	-	-	-
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.33	0.33	0.34	0.34	0.34	0.35	0.35	0.35	0.36	0.36
Rehab & Maintenance Costs	0.49	0.49	0.50	0.51	0.51	3.98	4.00	6.10	5.01	0.54
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	3.52	3.64	3.68	3.80	3.85	2.91	2.74	2.21	2.56	3.95
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.33	0.33	0.34	0.34	0.34	0.35	0.35	0.35	0.36	0.36
Rehab & Maintenance Costs	0.49	0.49	0.50	0.51	0.51	3.98	4.00	6.10	5.01	0.54
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	3.52	3.64	3.68	3.80	3.85	2.91	2.74	2.21	2.56	3.95

Start Date	1-Jan-39	1-Jul-39	1-Jan-40	1-Jul-40	1-Jan-41	1-Jul-41	1-Jan-42	1-Jul-42	1-Jan-43	1-Jul-43
End Date	30-Jun-39	31-Dec-39	30-Jun-40	31-Dec-40	30-Jun-41	31-Dec-41	30-Jun-42	31-Dec-42	30-Jun-43	31-Dec-43
Year	Year 2039	Year 2039	Year 2040	Year 2040	Year 2041	Year 2041	Year 2042	Year 2042	Year 2043	Year 2043
DBFOM										
Semi-Annual Cashflows										
Availability Payments	19.78	19.95	19.95	20.00	20.01	20.17	20.12	20.29	20.24	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	0.39	0.39	0.40	0.40	0.41	0.41	0.41	0.42	0.42	-
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	-	-	-	-	-	-	-	-	-	2.12
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.37	0.37	0.37	0.38	0.38	0.39	0.39	0.39	0.40	0.40
Rehab & Maintenance Costs	0.54	0.55	0.56	0.56	0.57	0.58	0.58	27.43	21.46	0.77
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	4.23	4.35	4.41	4.51	4.57	4.71	4.76	2.25	4.00	0.74
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.37	0.37	0.37	0.38	0.38	0.39	0.39	0.39	0.40	0.40
Rehab & Maintenance Costs	0.54	0.55	0.56	0.56	0.57	0.58	0.58	27.43	21.46	0.77
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	4.23	4.35	4.41	4.51	4.57	4.71	4.76	2.25	4.00	0.74

Start Date	1-Jan-44	1-Jul-44	1-Jan-45	1-Jul-45	1-Jan-46	1-Jul-46	1-Jan-47	1-Jul-47	1-Jan-48	1-Jul-48
End Date	30-Jun-44	31-Dec-44	30-Jun-45	31-Dec-45	30-Jun-46	31-Dec-46	30-Jun-47	31-Dec-47	30-Jun-48	31-Dec-48
Year	Year 2044	Year 2044	Year 2045	Year 2045	Year 2046	Year 2046	Year 2047	Year 2047	Year 2048	Year 2048
DBFOM										
Semi-Annual Cashflows										
Availability Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	1.68	1.73	1.71	1.73	1.75	1.77	1.79	1.81	2.87	1.85
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.41	0.41	0.42	0.42	0.43	0.43	0.44	0.44	0.44	0.45
Rehab & Maintenance Costs	0.61	0.66	0.62	0.63	0.63	0.64	0.65	0.65	3.05	0.67
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	-	-	-	-	-	-	-	-	-	-
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.41	0.41	0.42	0.42	0.43	0.43	0.44	0.44	0.44	0.45
Rehab & Maintenance Costs	0.61	0.66	0.62	0.63	0.63	0.64	0.65	0.65	3.05	0.67
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	-	-	-	-	-	-	-	-	-	-

Start Date	1-Jan-49	1-Jul-49	1-Jan-50	1-Jul-50	1-Jan-51	1-Jul-51	1-Jan-52	1-Jul-52	1-Jan-53	1-Jul-53
End Date	30-Jun-49	31-Dec-49	30-Jun-50	31-Dec-50	30-Jun-51	31-Dec-51	30-Jun-52	31-Dec-52	30-Jun-53	31-Dec-53
Year	Year 2049	Year 2049	Year 2050	Year 2050	Year 2051	Year 2051	Year 2052	Year 2052	Year 2053	Year 2053
DBFOM										
Semi-Annual Cashflows										
Availability Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	1.87	1.89	1.91	1.93	1.95	1.97	1.99	28.13	15.67	2.44
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.45	0.46	0.46	0.47	0.47	0.48	0.49	0.49	0.50	0.50
Rehab & Maintenance Costs	0.68	0.68	0.69	0.70	0.71	0.71	0.72	126.82	107.30	0.89
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	-	-	-	-	-	-	-	-	-	-
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.45	0.46	0.46	0.47	0.47	0.48	0.49	0.49	0.50	0.50
Rehab & Maintenance Costs	0.68	0.68	0.69	0.70	0.71	0.71	0.72	126.82	107.30	0.89
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	-	-	-	-	-	-	-	-	-	-

Start Date	1-Jan-54	1-Jul-54	1-Jan-55	1-Jul-55	1-Jan-56	1-Jul-56	1-Jan-57	1-Jul-57	1-Jan-58	1-Jul-58
End Date	30-Jun-54	31-Dec-54	30-Jun-55	31-Dec-55	30-Jun-56	31-Dec-56	30-Jun-57	31-Dec-57	30-Jun-58	31-Dec-58
Year	Year 2054	Year 2054	Year 2055	Year 2055	Year 2056	Year 2056	Year 2057	Year 2057	Year 2058	Year 2058
DBFOM										
Semi-Annual Cashflows										
Availability Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	2.08	2.11	2.13	2.15	2.18	2.20	2.22	4.60	4.21	2.58
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.51	0.51	0.52	0.52	0.53	0.54	0.54	0.55	0.55	0.56
Rehab & Maintenance Costs	0.75	0.76	0.77	0.78	0.79	0.80	0.80	2.98	0.82	0.94
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	-	-	-	-	-	-	-	-	-	-
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.51	0.51	0.52	0.52	0.53	0.54	0.54	0.55	0.55	0.56
Rehab & Maintenance Costs	0.75	0.76	0.77	0.78	0.79	0.80	0.80	2.98	0.82	0.94
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	-	-	-	-	-	-	-	-	-	-

Start Date	1-Jan-59	1-Jul-59	1-Jan-60	1-Jul-60	1-Jan-61	1-Jul-61	1-Jan-62	1-Jul-62	1-Jan-63	1-Jul-63
End Date	30-Jun-59	31-Dec-59	30-Jun-60	31-Dec-60	30-Jun-61	31-Dec-61	30-Jun-62	31-Dec-62	30-Jun-63	31-Dec-63
Year	Year 2059	Year 2059	Year 2060	Year 2060	Year 2061	Year 2061	Year 2062	Year 2062	Year 2063	Year 2063
DBFOM										
Semi-Annual Cashflows										
Availability Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	2.32	2.35	2.37	2.46	2.42	8.74	8.86	19.38	10.73	3.07
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.57	0.57	0.58	0.58	0.59	0.60	0.60	0.61	0.62	0.62
Rehab & Maintenance Costs	0.84	0.85	0.86	0.93	0.88	8.07	8.19	21.06	10.25	1.12
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	-	-	-	-	-	-	-	-	-	-
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.57	0.57	0.58	0.58	0.59	0.60	0.60	0.61	0.62	0.62
Rehab & Maintenance Costs	0.84	0.85	0.86	0.93	0.88	8.07	8.19	21.06	10.25	1.12
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	-	-	-	-	-	-	-	-	-	-

Start Date	1-Jan-64	1-Jul-64	1-Jan-65	1-Jul-65	1-Jan-66	1-Jul-66	1-Jan-67	1-Jul-67	1-Jan-68	1-Jul-68
End Date	30-Jun-64	31-Dec-64	30-Jun-65	31-Dec-65	30-Jun-66	31-Dec-66	30-Jun-67	31-Dec-67	30-Jun-68	31-Dec-68
Year	Year 2064	Year 2064	Year 2065	Year 2065	Year 2066	Year 2066	Year 2067	Year 2067	Year 2068	Year 2068
DBFOM										
Semi-Annual Cashflows										
Availability Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Post-handback public sector O&M costs	2.59	2.62	2.64	2.67	2.70	2.73	2.76	2.79	4.71	2.93
DBF										
Semi-Annual Cashflows										
Sponsor Payments	-	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.63	0.64	0.64	0.65	0.66	0.67	0.67	0.68	0.69	0.70
Rehab & Maintenance Costs	0.93	0.94	0.96	0.97	0.98	0.99	1.00	1.01	2.10	1.12
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax Adjustment	-	-	-	-	-	-	-	-	-	-
DBB										
Semi-Annual Cashflows										
Construction Payments	-	-	-	-	-	-	-	-	-	-
Operations Costs	0.63	0.64	0.64	0.65	0.66	0.67	0.67	0.68	0.69	0.70
Rehab & Maintenance Costs	0.93	0.94	0.96	0.97	0.98	0.99	1.00	1.01	2.10	1.12
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve										
Tax adjustment	-	-	-	-	-	-	-	-	-	-

Start Date	1-Jan-69	1-Jul-69	1-Jan-70	1-Jul-70	1-Jan-71	1-Jul-71	1-Jan-72	1-Jul-72	1-Jan-73
End Date	30-Jun-69	31-Dec-69	30-Jun-70	31-Dec-70	30-Jun-71	31-Dec-71	30-Jun-72	31-Dec-72	30-Jun-73
Year	Year 2069	Year 2069	Year 2070	Year 2070	Year 2071	Year 2071	Year 2072	Year 2072	Year 2073
DBFOM									
Semi-Annual Cashflows									
Availability Payments	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-
Public Sector Transaction & Contract Oversight Costs	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve									
Post-handback public sector O&M costs	2.88	2.92	2.95	2.98	3.01	3.05	3.08	199.31	171.65
DBF									
Semi-Annual Cashflows									
Sponsor Payments	-	-	-	-	-	-	-	-	-
Milestone Payments	-	-	-	-	-	-	-	-	-
Operations Costs	0.70	0.71	0.72	0.73	0.73	0.74	0.75	0.76	0.77
Rehab & Maintenance Costs	1.04	1.05	1.06	1.08	1.09	1.10	1.11	46.69	5.15
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve									
Tax Adjustment	-	-	-	-	-	-	-	-	-
DBB									
Semi-Annual Cashflows									
Construction Payments	-	-	-	-	-	-	-	-	-
Operations Costs	0.70	0.71	0.72	0.73	0.73	0.74	0.75	0.76	0.77
Rehab & Maintenance Costs	1.04	1.05	1.06	1.08	1.09	1.10	1.11	46.69	5.15
Public Sector Transactions & Construction Oversight Costs	-	-	-	-	-	-	-	-	-
Estimated Public Sector Retained Risk Reserve									
Tax adjustment	-	-	-	-	-	-	-	-	-

Appendix I:

Comparison of Port of Miami Tunnel Financing Data with Presidio Parkway DBFOM Option Assumptions

ARUP PB

I1 Comparison of Port of Miami Tunnel with Presidio Parkway DBFOM Option Assumptions

	PoMT Precedent	Presidio Parkway Base Case	Comparison with PoMT
Construction			
Construction Cost	$607m	$501m	lower
Construction dates	Oct 2009 to June 2014	Sep 2010 to June 2013	starts later
Construction period	5 years	3 years	2 years shorter
Funding Structure			
Milestone Payments	$450m	$150m	lower proportion of construction cost
Structure	$100m during construction and $350m at completion	$150m at the end of Contract 7	paid only after the road is available to traffic
Senior Debt	$340m	$118m	lower proportion of construction cost
Margin	300bps	300bps	same
Tenor	repaid between July 2014 and July 2015	repaid between 2013 and 2016	repaid over five years rather than one giving greater exposure to senior debt post construction
Drawdown	pro rata with TIFIA	pro rata with TIFIA	same
TIFIA	$340m	$309m	higher proportion of construction cost
Interest Rate	4.31%	4.15% (Sept. 03, 2009)	SLGS +1 bp
Capitalized Interest	during construction	during construction	same
Repayment Period	20yrs	27yrs	repayment continues until the end of the concession
Drawdown	pro rata with senior debt	pro rata with senior debt	same
Equity	$80m	$50m	similar proportion of construction cost
Required Return	11.33%	11.5%	rounded similar rate
Drawdown	Meridian first and Bouygues later	before senior debt and TIFIA	simplified for single investor
Distributions	$36m distribution (of construction reserves) on last milestone payment but no more until TIFIA repayments start after repayment of senior debt	no distributions until construction complete, TIFIA repayments started and commercial loan repaid	no payment to equity from construction reserves

Source: Arup

Appendix J:

Audit Opinion Letter

J1 Audit Opinion Letter

MERCER

MARSH MERCER KROLL
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22 January 2010

Ignacio Barandiaran
Arup / Parsons Brinckerhoff Joint Venture
560 Mission Street
Suite 700
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USA

Dear Ignacio,

AUDIT OPINION LETTER
DELIVERY OPTIONS FOR THE DOYLE DRIVE REPLACEMENT PROJECT
FINANCIAL MODEL AUDIT

Introduction

In accordance with the Terms of Engagement dated 13 January 2010 ("Terms of Engagement") between Mercer and Arup North America Limited ("Arup"), Mercer has performed an audit of the financial model (the "Model") developed by Arup on behalf of the joint venture between Arup and Parsons Brinckerhoff ("the Sponsor") to analyse delivery options for the Doyle Drive Replacement project (the "Project"), updating our review for subsequent amended versions of the Model, the final version being:

- *21-01-10 Doyle Drive Financial Model FINAL.xlsm* dated 21 January 2010, 8:46:56 PM, with a size of 1,996,062 bytes.

This Audit Opinion Letter ("Report") sets out our financial model audit statement arising from our audit of the Model.

Information Provided

In addition to the Model, Mercer was provided with a MS Word Document named Doyle Drive Assumption Book 21-01-2010 FINAL.docx and dated 20 January 2010 ("Assumptions Book").

Mercer makes no comment on the consistency or otherwise of the Model to any documents other than the Assumptions Book.

MERCER

MARSH MERCER KROLL
GUY CARPENTER OLIVER WYMAN

Scope of Work

Mercer understands that the objective of the Model is to generate:

(a) projected profit and loss statements, balance sheets, cash flow statements;

(b) projected Availability Payments and net present value of the Sponsor's future cashflows under Design Build Finance Operate and Maintain procurement;

(c) projected Sponsor's Construction Payments and net present value of the Sponsor's future cashflows under a Design Build Finance procurement; and

(d) projected Sponsor's Construction Payments and net present value of the Sponsor's cashflows under a Design Bid Build procurement,

on the basis of assumptions made and input data as provided in the Assumptions Book and Model (the "Objectives").

The objective of Mercer's audit of the Model is to comment on whether, in its opinion:

- the Model has, so far as its mechanical construction is concerned, been constructed appropriately, which inter alia encompasses the correct logic and mathematics being used, so as to achieve the Objectives;
- the Model has been constructed so as to achieve the Objectives after adjusting the assumptions and the input data in order to reflect sensitivities; and
- the Model produces financial statements and cash flows which are materially consistent with the assumptions listed in the Assumption Book.

Mercer's scope of work was limited to performing a complete cell-by-cell audit of the Model encompassing the following checks:

- that the internal logic and formulae incorporated in the Model and various calculations are sound, correct and internally consistent and that based on the assumptions made the accuracy of the results can be relied upon;
- that the formulae are consistent across all time periods and there are no circularities;
- that the Model allows changes to assumptions to correctly and logically flow through to the results;
- that the Model is suitable for sensitivity analysis in respect of key operating and financial parameters; and
- that the Model materially reflects the assumptions contained in the Assumptions Book.

Exclusions

Any projections of the future financial performance of an entity are based upon judgement and opinion as to the numerous factors that may influence the various components of the projections. Accordingly, we do not express any opinion as to whether any forecast or projection for the Project will be achieved, or whether any assumptions or source data input to the Model and underlying any forecast or projection of the Project are reasonable. Mercer does not guarantee any statements as to future prospects of the Project. Our findings do not constitute recommendations as to whether or not the Project should proceed. We have no responsibility to update this report for subsequent changes to the Model.

Mercer has not received Project documents, other than the Assumptions Book, relating to the operations, financing, accounting or tax status of the Project. For the avoidance of doubt, Mercer has not compared debt cover ratios or other credit covenants contained in the Model against any Project documents.

In providing this Report, Mercer does not validate the application of tax or accounting legislation or regulations. Nor does Mercer take into consideration the commercial merits of the Project and the factual accuracy of the input data or validity of the underlying assumptions.

Mercer has not received any legal or other advice concerning the interpretation of any material supplied to Mercer or the way in which any Project documents have been interpreted by the Sponsor, Arup or any third parties in determining any assumptions or input data advised to Mercer.

Mercer accepts no responsibility for any errors within the hardware or any software application used to run the Model.

As a result of our review of the Model, we noted issues that were advised to Arup and addressed on a progressive basis. All issues identified were either resolved or were deemed in conjunction with Arup not to be material either individually or collectively to the integrity and output of the Model. Note that in making these determinations Mercer has relied upon the accuracy and completeness of the responses provided by Arup to the issues we raised. Amendments to the Model that have not been logged and accepted by Mercer are deemed to be outside the scope of our review.

Comments

The Model contains links to the following external workbooks ("External Workbooks"):

- 08-12-10_DD_model_master(3).xlsm;
- 091214 DD PPP Analysis edits.xlsx;
- 091214 Doyle drive P3 OM Cost Forecast Summary NPV Comparison.xls; and
- Scenario output v2.xlsx.

Mercer has not been provided with the External Workbooks. An audit of the External Workbooks falls outside Mercer's scope of work for the Project. Arup has advised Mercer that the External Workbooks relate to technical cost inputs to the Model that are summarized in the Assumptions Book.

Mercer has therefore not audited these External Workbooks and has assumed:

- The assumptions and calculations within the External Workbooks are consistent with the Model;
- the calculations and results of the External Workbooks are correct, complete and reliable;
- the links within the External Workbooks are correct, complete and reliable; and
- the links between the External Workbooks and the Model are correct, complete and reliable.

The following graphs are based on data series that have been hard-coded on the worksheet named 'Charts Data' of the Model or data series that are stored in the External Workbooks. Mercer has not verified the results of these data series and therefore makes no comment on the accuracy or reliability of the results underlying these graphs:

- *Exhibit 34a -Funding Drawdown and Repayment (NPV$, Million)*;
- *Exhibit 36 - DBFOM Effect of Discount on Financing Cost;*
- *Exhibit 50 - Impact of Discount Rate on the NPV Difference between DBB and DBF / DBFOM Options;*
- *Exhibit 52 - Impact of Discount Rate on the NPV Difference between DBB and DBF / DBFOM Options*; and
- *Exhibit 53 - Impact of Discount Rate on the NPV Difference between DBB and DBF / DBFOM Options.*

Arup has advised Mercer that these charts relate to scenario analysis that is undertaken using multiple iterations of the Model.

Statement

Given the exclusions and comments above, Mercer reports that:

- The Model has, so far as its mechanical construction is concerned, been constructed appropriately, which inter alia encompasses the correct logic and mathematics being used, so as to achieve the Objectives.

- The Model has been constructed so as to achieve the Objectives after adjusting the assumptions and the input data in order to reflect sensitivities.

- The Model produces financial statements and cash flows which are materially consistent with the assumptions listed in the Assumptions Book.

This opinion is given solely in respect of the Model as defined and is valid if assumptions and input data are altered. However, the reasonableness of the results produced by the Model will be dependent on the reasonableness of the changes made to the assumptions and input data. Furthermore, it should be noted that changing assumptions and input data in the Model may result in the Model's assumptions no longer being consistent with the Assumptions Book.

MERCER

MARSH MERCER KROLL
GUY CARPENTER OLIVER WYMAN

Finally, this opinion ceases to be valid if there are subsequent changes to the coding and/or logic of the Model.

Yours sincerely,

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Caltrans

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

Appendix K:

Glossary of Terms

ARUP PB

K1 Glossary of Terms

Term	Definition
BOO	Build-Own-Operate
bps	Basis points
Caltrans	California Department of Transportation, or "the Department"
Capital Cost	Costs that are capitalized; these include support costs for design and construction management
CEQA	California Environmental Quality Act
Concessionaire	A private sector firm formed by one or more equity investors to design-build-finance-operate-maintain the asset under a concession agreement with a public entity.
CPI	Consumer Price Index
CTC	California Transportation Commission
DB	Design-Build
DBB	Design-Bid-Build
DBF	Design-Build-Finance
DBFOM	Design-Build-Finance-Operate-Maintain
DOT	Department of Transportation
DSCR	Debt Service Coverage Ratio
EE	Engineer's Estimate
FEIS/R	Final Environmental Impact Statement / Report
FHWA	Federal Highway Administration
FTE	Full-Time Equivalent
GARVEE	Grant Anticipated Revenue Vehicle (debt financing instrument for state highways)
GGBHTD	Golden Gate Bridge, Highway & Transportation District
GGNRA	Golden Gate National Recreation Area
HAZMAT	Hazardous Material
ITS	Information Technology Systems
LOS	Level of service
MTC	Metropolitan Transportation Commission
NB	North bound
NEPA	National Environmental Policy Act
NPV	Net Present Value
O&M	Operations and Maintenance
ODCs	Other Direct Costs
P3	Public Private Partnership or PPP
PAB	Private Activity Bond
PCM	Percentage Completion Method
PFI	Private Finance Initiative
PIAC	Public Infrastructure Advisory Committee

Term	Definition
PoMT	Port of Miami Tunnel
PPP	Public Private Partnership or P3
Presidio	Presidio of San Francisco
Project Sponsors	the San Francisco Transportation Authority and the California Department of Transportation
PS&E	Plans, Specifications, and Estimates
QAQC	Quality Assurance and Quality Control
R&R	Replacement and Rehabilitation
RFP	Request for Proposals
RFQ	Request for Qualification
ROW	Right of Way
RTA	Regional Transportation Agency
SAFETEA-LU	Safe, Accountable, Flexible, and Efficient Transportation Equity Act: a Legacy for Users
SB	South bound
SB4	Senate Extraordinary Session Bill 4, allowing P3s in California for Caltrans and RTAs. Abbreviation of SBX2 4.
SBX2 4	Senate Extraordinary Session Bill 4, allowing P3s in California for Caltrans and RTAs, Also SB4
SCTA	Sonoma County Transportation Authority
SHA	State Highway Account
Shadow Bid	A bid model based on estimates of what the private sector is likely to deliver
SHOPP	State Highway Operation and Protection Program
SLGS	State & Local Government Series (securities)
SPE	Special Purpose Entity
SPV	Special Purpose Vehicle
TAM	Transportation Authority of Marin County
The Project	Design & Construction of Contracts 5-8 and O&M of Contracts 3-7 for the Presidio Parkway Project
TIFIA	Transportation Infrastructure Finance and Innovation Act of 1998
TOMIS	Traffic Operations Management Information System
TOR	Time-Related Overhead
UC	Under Crossing
USDOT	U.S. Department of Transportation
VfM	Value for Money
WACC	Weighted Average Cost of Capital
YOE	Year of Expenditure
YOE$	Year of Expenditure Dollars (or nominal dollars)

Caltrans

SAN FRANCISCO COUNTY TRANSPORTATION AUTHORITY

Appendix L:

Consultant Team's Contact Information

ARUP PB

L1 Consultant Team's Contact Information

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